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BONE OPERATIONS FOR THE CORRECTION OF CLUB-FOOT, BASED UPON AN ANALYSIS OF 435 OPERATIONS BY 108 OPERATORS.

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WHILE statistics are acknowledged to be of doubtful value at their best in establishing positive facts, still they often occupy important positions in the selection of the remedial measures that have the best chances of success at the least risk. The statistics that are here offered were gathered from a very large source, and while they may not embrace all the cases operated upon by the various operators whose names are given, nor all the cases thus operated upon by other surgeons, they include enough material from which to draw some inferences that will be of service.

The object sought was not to compare the results obtained by the various surgeons, but rather to ascertain: First, as to the statement often made that the mortality in bone operations in club-foot was a high one. Secondly, to ascertain the age of the patient when such operation was deemed advisable or expedient. Thirdly, the form of operation generally selected or the amount of bone tissue that was deemed necessary to remove in order to obtain correction. Fourthly, whether joint motion or ankylosis was sought. Fifthly, whether subsequent orthopedic apparatus or braces were required. Sixthly, whether the general usefulness of the foot was deemed better than could be obtained by other means. Seventhly, as to the selection of cases suitable for bone operation.

Under the head of mortality I have found but 3 cases out of 435 that died of septicæmia, while 3 deaths in addition are ascribed to

diarrhœa, and 1 other to carbolic-acid poisoning. One death from septicæmia followed three weeks after amputation, which was done for unavoidable hemorrhage after bone operation. Including all of these 7 cases only gives a mortality of 1.6 per cent. The wound was stated to be septic in 2 cases, and it is recorded that suppuration took place in 13 cases, making a total of 15 cases, or 3.45 per cent., in which this condition is stated as having occurred within two months after operation. Gangrene occurred in 1 case and required amputation, from which the patient recovered. In 2 cases, or 0.46 per cent., eczema was ascribed to the use of iodoform, and there were 2 cases, or 0.46 per cent., ascribed as a failure, but no explanatory statement was obtained. Erysipelatous inflammation occurred but once, or 0.23 per cent., so that it will be perceived that the statement with reference to the high mortality does not appear to be well established if these cases are taken as a basis. In the correspondence to be referred to subsequently it will be found that Dr. John Ashhurst, Jr., referred to a case of cuneiform osteotomy of the tarsus that he did in an adult, with subsequent amputation and death; and also that of Dr. Lewis A. Sayre, in which he refers to 2 cases, 1 of which had amputation done subsequently and the other died of septicæmia.

Secondly. The age of the patient when such operation was deemed advisable or expedient.

Excluding the 21 cases in which the age was not recorded (not stated, 15; as an infant, 2; as a child, 3; as an adult, 1), 414 cases are left ranging from three weeks of age to forty-seven years. Of this number, 234, or $53\frac{3}{4}$ per cent., were operated upon prior to the age of ten years; 126, or 29 per cent., prior to the age of six years; 29, or $6\frac{2}{3}$ per cent., prior to the age of two years; and 13 cases, or 2.9 per cent., prior to the age of one year. Between the ages of six and eighteen, inclusive, there were 240 cases operated upon, or $55\frac{1}{4}$ per cent. These, of course, clearly indicate that there is no age between the earliest months of infancy and the age of forty-seven years in which the operation has not been performed, and it is presumed that those who have operated at the early ages given were satisfied that it was justifiable to resort to such extreme measures at such an early period.

Age.	Cases.	Age.	Cases.
3 weeks	1	13 "	13
2 months	2	13½ years	1
2½ "	2	14 "	21
4 "	2	14½ "	1
5 "	1	15 "	16
6 "	2	16 "	6
7 "	2	17 "	5
10 "	1	18 "	9
12 "	1	19 "	3
15 "	5	20 "	4
16 "	1	21 "	8
17 "	1	22 "	6
18 "	6	23 "	1
20 "	2	24 "	1
2 years	7	25 "	5
2½ "	1	27 "	2
2½ "	6	28 "	4
3 "	16	29 "	1
3½ "	7	30 "	1
4 "	33	31 "	1
4½ "	1	32 "	2
5 "	25	33 "	2
5½ "	1	35 "	1
6 "	30	36 "	1
6½ "	2	41 "	2
7 "	30	43 "	1
7½ "	1	44 "	1
8 "	17	47 "	1
9 "	25	Age not stated	15
9½ "	3	Infant	2
10 "	24	Child	3
11 "	15	Adult	1
12 "	21		

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I have been unable to ascertain the grounds for selecting bone operations in preference to other well-known and equally reliable procedures prior to the age of eight and twelve years, at which time it is presumed that the bones of the foot are firmly ossified and unyielding.

Thirdly. The form of operation generally selected :

	Cases.
Excision of astragalus	156
Excision of astragalus and cuboid	5
Excision of astragalus and cuboid and scaphoid	3
Excision of astragalus and cuboid and scaphoid and part of calcaneum	1
Carried forward	165

	Cases.
Brought forward	165
Excision of astragalus and cuboid and scaphoid and part of calcaneum and three cuneiforms	1
Excision of astragalus and cuboid and part of calcaneum	3
Excision of astragalus and cuboid and part of cuneiform	1
Excision of astragalus and cuboid and part of calcaneum and scaphoid	2
Excision of astragalus and cuboid and part of calcaneum and scaphoid and external malleolus	2
Excision of astragalus and cuboid and part of scaphoid and external cuneiform	2
Excision of astragalus and cuboid, scaphoid, os calcis, and cuneiform	1
Excision of astragalus and scaphoid	7
Excision of astragalus and scaphoid and external malleolus	3
Excision of astragalus and part of scaphoid	1
Excision of astragalus and part of calcaneum	2
Excision of astragalus and part of calcaneum, cuboid, scaphoid, and wedge from tibia and fibula	2
Excision of astragalus and part of calcaneum and malleolus	1
Excision of astragalus and anterior end of calcaneum	7
Excision of astragalus, anterior end of calcaneum, and external malleolus	3
Excision of astragalus and resection of malleolus	8
Excision of astragalus and resection of cuboid and os calcis	1
Excision of astragalus and resection of tibia and fibula	1
Excision of astragalus and cuneiform osteotomy	6
Excision of head of astragalus	5
Excision of head of astragalus, neck and trochlea, and part of calcaneum	1
Excision of parts of astragalus, cuboid, cuneiforms (second and third)	2
Excision of parts of astragalus, cuboid, and scaphoid	1
Excision of anterior articular surface of astragalus	1
Wedge from head of astragalus and cuboid	2
Wedge through astragalus, cuboid, scaphoid, and os calcis	3
Wedge through astragalus, cuboid, scaphoid, os calcis, and one cuneiform	1
Wedge from neck of astragalus and calcaneum	1
Posterior section through neck of astragalus and part of calcaneum, anterior section through cuboid and cuneiform	1
Excision of tarsus from a line through neck of astragalus to metatarsus	2
Osteoplastic resection (Mikulicz-Vladmiroff)	1
Tarsectomy	12
Excision of whole of ankle-joint	1
Excision of wedge of tarsus	13
Excision of tarsus and external malleolus	2
Excision of cuboid	18
Excision of cuboid and cuneiform	1
Excision of cuboid, parts of external and middle cuneiform, scaphoid, and astragalus	4
Carried forward	291

	Cases.
Brought forward	291
Excision of scaphoid	4
Resection of cuboid	2
Resection of cuboid and half of first and second cuneiforms and all of third	1
Resection of cuboid and external cuneiform and os calcis	1
Excision of cuboid, external and middle cuneiforms, and part of scaphoid	1
Excision of cuboid, external and middle cuneiforms, and part of scaphoid and os calcis	1
Excision of wedge from cuboid	3
Excision of wedge from cuboid and scaphoid	1
Excision of wedge from cuboid, scaphoid, and cuneiforms (second and third)	1
Excision of wedge from cuboid and calcaneum	1
Excision of wedge at trans-tarsal joint	20
Linear osteotomy	8
Linear osteotomy of neck of calcaneum and astragalus	3
Linear osteotomy and cuneiform resection	8
Linear osteotomy and external malleolus	1
Linear osteotomy and excision of cuboid and scaphoid	2
Osteoclasis of tibia and fibula	9
Phelps'	14
Phelps', two wedges removed	2
Phelps', wedge from outer side of tarsus	3
Phelps', wedge from os calcis	1
Phelps', excision of cuboid	1
Phelps', excision of cuboid and parts of external and middle cuneiforms, scaphoid, and astragalus	1
Arthrodesis	6
Phelps', excision of cuboid, external and middle cuneiforms, and fifth, fourth, and third metatarsals	1
Phelps', excision of head of astragalus and part of calcaneum	2
Reeves' operation	6

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Note.—Five cases had double operations on same foot.

In 156 cases, or 36 per cent., the astragalus was the only bone removed. In 274 cases, or 63 per cent., not only was the astragalus removed but other surrounding bones were either removed entirely or in part, the greatest amount of removal being in a case where, together with Phelps' operation, the astragalus, cuboid, cuneiform, and scaphoid were removed. In 1 other case an osteoplastic resection was done. Tarscetomy, without describing the extent, was performed 12 times, or 2.7 per cent.; and in the same manner a wedge of tarsus was removed 78 times, or 18 per cent. In 25 cases, or 5.8 per cent., Phelps' operation was performed, and it is included

in this list of operations because, though not a bone operation, it was often done alone upon one foot of a patient and in connection with a bone operation upon the other foot, 14 times without bone operations, and 11 times accompanied with more or less extensive removal of bone from the same incision, or with an additional incision on the outer side of the foot.

The very extensive amount of bone removed in so many of the cases here recorded would seem to more clearly indicate the necessity for resorting to other measures to which Phelps has so ably drawn attention before attempting correction by removal of bone. The factors which are present in any given case of resistant club-foot involve resistance to correction as produced by one or other, or both, of the following conditions: First, there is an undoubted contraction or shortening on the inner aspect of the foot, while secondly, there is, as it were, a surplus on the outer side of the foot, together with elongation.

Many of the operations for the removal of bone seem to have been performed with the idea that it was necessary to remove enough tissue from the outer part to make the foot as short upon the outside as it was upon the inside, without any attempt, except in the 25 cases where Phelps' operation was performed, to elongate the inner aspect of the foot. This will undoubtedly explain the statement so frequently made in the statistics, that the foot after operation was preternaturally short and stumpy. Linear osteotomy of various parts, as devised and performed by E. H. Bradford, M.D., was done 22 times; osteoclasis of tibia and fibula, 9 times by Grat-tan; arthrodesis, 6 times; Reeves' operation, 6 times.

Fourthly. Whether joint motion or ankylosis was sought. It is a matter of very great regret that I was unable to obtain more definite information as to this question. Of course, it is only applicable to those cases where there was a removal of the astragalus only, or a linear osteotomy, for in nearly all other cases of bone excision, joint motion could not be expected, and, further, the subsequent usefulness of the foot naturally depended upon there being a firm bony union of the surfaces which were divided.

To my mind, the presence or absence of joint motion after excision of the astragalus is a most important element in deciding as to the expediency of resorting to the removal of this bone in certain resistant

cases. There is a certain class of cases occurring in adult life where all previous measures, whether operative or mechanical, have obtained a fairly good correction of the foot, but where there still remains slight inversion, the maintenance of the correct position of which depends upon the use of more or less heavy braces. In these cases it is usually found that when the foot is held in the everted right-angle position the whole form of the tarsal bones produces a jamming or crowding together at the ankle-joint which prevents full, free motion.

In many of these cases it would appear to me to be advisable to remove the astragalus, or so much thereof as might be necessary in order to free the joint from this condition of jam. The same condition would be favorable for a linear osteotomy, and equally good, if not better, functional results could be obtained. It has been my experience that in these cases the subsequent joint motion approaches very nearly to that of the natural foot, and renders it not only best but advisable to dispense with the use of the correcting apparatus.

Fifthly. Whether subsequent orthopedic apparatus or braces were required. With comparatively few exceptions, it is stated that braces or some form of apparatus or support were required in nearly all of the cases here recorded. The various reasons given for their use may be classified under the condition of muscular atrophy from disuse. In a great many of the cases it would appear to me that nothing had been gained except the appearance of correction, inasmuch as an apparatus, very nearly identical with that ordinarily employed, was required just as much after as before, and there was not a restoration of the mechanical functions.

Sixthly. Whether the general usefulness of the foot was better than could be obtained by other means.

Two others died of measles, and one other was supposed to have died of epilepsy, and two of consumption several years after operation.

It will be observed that the feet were not entirely corrected in 9 cases; unsatisfactory, 9; tendency to recur, 17; some subsequent operative procedure was required in 5, making 40 cases which the operator records as not being benefited. Amputation was done in 2 cases for pain.

Immediate Results within Two Months after Operation.

Foot in excellent condition	43
Foot satisfactory	75
Good	139
Wound healed	38
Perfect position; walks with ease	5
Foot normal shape	3
Bones firmly united	2
Wounds still open	5
Wound not aseptic	15
Tending to relapse	5
Amputation for uncontrollable hemorrhage; death in three weeks from septicaemia	1
Unsatisfactory	10
Erysipelatous inflammation	1
Gangrene—amputation	1
Failure	2
Eczema	2
Not stated	87
Extra sinus from drainage-tube	1

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Subsequent Results.

Walked with apparatus	16
Walks firmly	3
Walks without apparatus	13
Cured	26
Excellent	105
Good	100
Walks with ordinary shoe	7
Ankylosis	6
Recovery	26
Flat-foot	1
Not entirely corrected	9
Unsatisfactory	9
Tendency to recur	17
No voluntary motion	1
Subsequent operation	5
Painful—Symes' amputation	2
Slough	1
Death—carbolic acid poisoning	1
Death—diarrhoea	3
Death—septicaemia	3
Not stated	81

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It requires no statistics nor argument to emphasize the statement that were all cases of congenital club-foot treated from birth and maintained under careful observation for a safe time, no such

extensive operation as that of removing any portion of the tarsus would ever be required. In the class of cases in which may be classified relapsed cases, or those which have passed the period of infancy without attention, it is also a matter of experience that a very large majority, if not all, could be corrected by soft-structure section, either with manual or mechanical stretching and tearing, and the application of developmental methods; so that, to my mind the percentage of cases suitable for bone excision is extremely small. Under this heading, I believe, the statement that I have just made, based upon my own experience, could be emphasized by quoting from personal letters obtained in the course of my efforts to obtain these statistics.

LETTERS.

Newton M. Shaffer, M.D.: "I have no cases to report. As you know, my orthopedic work does not include any case that does not require special orthopedic care after operation, and these cases to which you refer I have sent to general hospitals. If your query was 'How many cases have you had which have been condemned to osteotomy and which you have cured without operation?' I could give you some statistics."

P. Lorenzen, M.D.: "Having five years ago collected the cases treated with bone operations before 1887, I have accepted the proposition made to me by Dr. Siegfried Levy, to answer your letter of the 4th of February, this year, and fill in your blank with these cases. There may be many more cases operated upon in the same manner afterward, but during the later years, most of the cases of severe club-foot have been corrected here in Copenhagen by division of the soft parts through open incision (after Phelps). I think it can only be a few, and my time not permitting me at this moment to look after them, I send you the before-mentioned cases in the hope that some of them may be of use to you."

Prof. A. Lorenz: "I consider every bone operation in club-foot as a mutilation of the foot and as a criminal act to the practice. Nine years ago I excised the talus in a double congenital club-foot, with moderately good results; since then I treat all cases with splints, and I am thereby enabled to change every club-foot, of

any degree and age, into a nearly normal foot. The paper concerning this treatment, which proves every operative procedure except section of the tendo Achillis as unnecessary, is in process of publication."

Ap Morgan Vance, M.D.: "I have done only one case of bone operation for the correction of club-foot, and that a few days before your letter came. This was the case of a girl baby two years of age whom I have treated continually since three months old. The bones were so much displaced that only an imperfect result was obtainable, hence the excision of the astragali, the cuboid on one foot being also removed. I think the result will be excellent, but it is too soon yet to report. This is the first case that I have met with where I considered the operation justifiable, except a few older cases who would not submit to any interference."

George Ryerson Fowler, M.D.: "At one time I was quite encouraged to think this operation one which would prove of great service. Later operations, however, have not confirmed this belief, and I have not resorted to it recently."

Flor. Bech, M.D.: "To my regret, I am unable to furnish a contribution to your work. With my patients who were afflicted with club-foot I have never felt the need of an operation (with the exception of subcutaneous separation of the tendons). I have always made out with powerful bending and pressing by means of the hands or with the assistance of apparatus. After every bending—which was undertaken, among other things, every week, or still oftener—the foot was fixed in the improved position by means of a plaster cast or an apparatus. I, of course, cannot wish to affirm that one will succeed by this method with all club-feet; by chance this method has sufficed with all patients whom I have had under treatment."

H. N. Burrell, M.D.: "Enclosed you will find what work I have done in the matter of osteotomy. I have found it rarely necessary, but both of these cases are satisfactory in their results."

Sir James Paget: "I am very sorry that I cannot supply you with any facts concerning bone operations for club-foot. They were, I think, very rarely performed during the time in which I was in the habit of operating."

E. Muirhead Little : "Your letter of the 4th inst. addressed to my father, Dr. W. J. Little, is before me, he having left it to me to reply to your question, as he has retired from practice and now lives in the country. Although it was at his suggestion that the first tarsectomy was performed by the late Mr. Solly; he himself never performed any operation on the bones for club-foot. His experience has been that tenotomy and well-directed instrumental and manual treatment sufficed to procure good results. If you care to have my own opinion, I would add that I have not, during the thirteen years that I have been connected with the Orthopedic Hospital here, done any bone operations for the cure of club-feet, but that I believe that in certain cases such an operation may be needed, but not in many. I have lately performed several open incision operations after the manner of Dr. Phelps. I am sorry that I cannot help your inquiry more."

Victor Horsley, M.D. : "I very rarely see a bad talipes requiring operation on the tarsus. All the cases of club-foot that come to me either at Queen's Square or University Hospitals are early cases for which tenotomy invariably suffices."

John E. Owens, M.D. : "I regret to say that I have no cases of bone operations for the correction of this deformity, nor do I think that the records of St. Luke's Hospital, of which I am one of the attending surgeons, possess any."

Sir W. MacCormac : "In regard to the table, I cannot, I regret, contribute to it."

Samuel Ketch, M.D. ; "I am sorry to say that I have no personal cases to add to your report."

Basil Norris, M.D. : "I have no personal experience in such operations, and regret that I cannot assist you by contributing information or suggestions."

Royal Whitman, M.D. : "I have never performed the operation of excision of the astragalus, and am therefore unable to answer your questions. I have seen the operation several times, but only in cases of very marked deformity, when as a final result of any method of treatment, free motion could not have been expected. I think it an operation of last resort in neglected cases."

J. E. Moore, M.D.: "As you see, I have found it necessary to do bone operations very rarely. It seems rather strange that I have not operated more frequently, since I am a general surgeon; and, frankly, I am sure I would have done better in some of my cases if I had operated."

John Ashhurst, Jr., M.D.: "I have twice employed cuneiform osteotomy of the tarsus for varus, once in a child, a patient of Dr. Sydney Roberts, on both feet, successfully, and once in an adult with subsequent amputation and death. I have also twice removed the astragalus for varus and once for valgus, with good results. I regret that I have not recorded sufficient particulars of these cases to enable me to fill your blank."

W. R. Townsend, M.D.: "I think the operation is very seldom required except in cases seen late in life, where the increase in bone on one side is a mechanical impediment to reduction."

Dillon Brown, M.D.: "I am sorry to be unable to add to your list of cases as I have never performed any bone operations in a case of club-foot."

Robert W. Lovett, M.D.: "I am sorry that I cannot give you any information about the question of bone operations for club-foot. It so happens that nearly all, if not all, of the bone operations that I have had have been simple cutting operations, and I do not think, as far as I can remember, that I have done any bone operations. If I have, it was so long ago that I have forgotten the details, and I cannot lay my hands on the case."

James K. Young, M.D.: "I regret that I have none to report at present. I have assisted Dr. Willard in a great many, but have avoided such operations in my own cases."

R. F. Weir, M.D.: "I have had no experience with the operation referred to in yours of the 4th inst. Regretting that I cannot aid you."

A. J. Steele, M.D.: "I have done no bone operations for club-foot. What I first knew of it, positively, was under Mr. Davy, over nine years ago. Osteotomy has its place in aggravated cases, but hereafter will rarely be necessary and never popular, because the

correct treatment of recent club-foot is becoming and will become so personally known that cases will be taken early and corrected."

John Homans, M.D.: "I have never done any bone operations for correction of club-foot—*i. e.*, any osteotomies."

N. Senn, M.D.: "I have usually succeeded in correcting club-foot by *brisement forcé* with or without tenotomy. Recently a man, aged twenty-five years, came into my clinic with a bony aggravated congenital club-foot. The only way in which I could get the foot into proper position was a combination of Dr. Phelps' operation and a cuneiform tarsectomy, removing a wedge-shaped section from outer aspect of tarsus. The functional result is perfect—three months after operation."

B. E. McKenzie, M.D.: "I have never performed any bone operations for the correction of club-foot deformity but once. In a case which I have not published, a boy, aged twelve years, had osteomyelitis when an infant, causing destruction of the lower growing area of the tibia. In consequence the foot was thrown inward and the bones greatly curved in the last four inches, causing great prominence of the external malleolus and causing the foot to roll over on its outer edge. I removed (December, 1891) a section of one inch from fibula, subperiosteally cut the tibia and replaced the foot. Healing by first intention; walking in three months; entire correction of the deformity; shortening two and a half inches; about half natural motion at the astragalo-crural joint. I should have said that after osteotomy I chiselled out the epiphysial cartilage from the end of the fibula, so as to prevent a recurrence of the deformity. Apart from the above, I have not found any bone operations necessary. In all other cases I have employed torsion, tenotomy, fasciotomy, and open incision. (In the case related above the boy uses a shoe having a cork sole of two inches, and his walking is greatly improved.)"

A. Cabot, M.D.: "I am sorry to say that I have no record of my club-foot cases, and have had very little experience in the resection of bone for this disease."

C. H. Mastin, M.D.: "It just so happens that in a large general surgical practice, one in which, from time to time, I have had a

number of club-foot cases, I have never as yet met one which I have not been able to correct satisfactorily to the patient as well as myself, by the use of well-constructed apparatus and aided by tenotomy. I do not in the least doubt, in some cases, the advisability of removing a part or more of the tarsal bones in order to correct a deformity which will not yield to less radical measures. The operations of my friend Morton, and his paper read before the American Surgical Association in one of the recent meetings, have convinced me of this fact. As I have said before, no case has as yet fallen under my observation which demanded such procedure, and hence I have not resorted to it."

Ansel G. Cook, M.D.: "I have done no bone operations for the relief of talipes, and am sorry there is nothing I can put on the enclosed blank."

William G. Porter, M.D.: "I have had no personal experience in bone operations for the correction of club-foot. I have twice excised the astragalus and performed numerous other operations on the bones of the foot, but not for the relief of club-foot."

Benjamin Lee, M.D.: "I have had no experience whatever in this class of operations."

John C. Schapps, M.D.: "I have never done any bone operations for these cases."

W. H. Carmalt, M.D.: "I have never done a bone operation for talipes."

Lewis A. Sayre, M.D.: "I have no personal experience in osteotomy for club-foot, having seen only two cases which I could not correct without this procedure. I gave one of these cases to Dr. Stephen Smith and the other to Dr. E. Mason. One had amputation done subsequently, and the other died of septicæmia."

A. Sydney Roberts, M.D.: "I never did an osteotomy for talipes."

T. Halsted Myers, M.D.: "It has been my custom to refer to the general surgeons, both in private and hospital patients, those cases of talipes which I thought needed operations on the bones, so I have no personal experience to give you."

J. Ewing Mears, M.D. : "I regret I have no cases of bone operations for the correction of club-foot to report."

Lewis A. Stimson, M.D. : "I can only say that I have removed the astragalus for talipes only in the young ; the immediate result has always been good, but the patients have always disappeared promptly from observation. Cuneiform osteotomy, or rather free removal of the tarsus through an outer incision, I have done only in adults or well-grown adolescents ; the results, early and late, have been excellent. I make complete correction and use no brace afterward."

Reginald H. Sayre, M.D. : "I can only say that I have never as yet been obliged to perform any. In the cases I have seen which have been operated upon by other gentlemen, it seemed to me that the result was inferior to that which might have been secured by thorough division of such soft parts as prevented rectification of the deformity, supplemented by forcible rectification of deformity and careful after-treatment to prevent recurrence of distortion. In those cases where some of the bones of the leg and foot are wanting it may not be possible to secure a good foot except by bone operations, but in cases not complicated by such abnormalities it seems to me that bone operations must be *very* rarely necessary."

E. G. Brackett, M.D. : "I do not know that I shall be able to help you very much on the schedule, as most of my experience has been in operative club-foot upon very young children, where, of course, a bone operation is not called for."

A. B. Judson, M.D. : "I have no cases to report."

THE CORRECTION OF TALIPES-VARUS OR EQUINO-VARUS BY EXCISION OF ASTRAGALUS, CUNEIFORM OSTEOTOMY, OR OTHER BONE OPERATIONS.

1. Prof. Edmund Andrews. Not published. Patient 25 years of age. Extreme equino-varus. Opposite foot has talipes-valgus from former temporary infantile paralysis; corrected it by tenotomy and a brace which he still wears at last accounts. Excision of the whole ankle-joint. Recovery. Permanent correction of deformity with ability to walk on the foot very well.
2. Drs. Augustoni and Panzeri. *Archivio di Ortopedia*, 1888, p. 172 et seq. Patient 4 years old. Equino-varus, right, congenital, grave. Tarsectomy Nov. 15, 1887. Everything proceeded regularly; discharged Jan. 22, 1888.
3. Same operators and reference. Patient 4 years of age. Equino-varus, right, congenital. Nov. 20, 1887, extirpation of the astragalus. Left the hospital perfectly cured after the regular course of treatment.
4. Same operators and reference. Patient 10 years of age. Equino-varus, right, congenital, grave. Atrophy of all the muscles of the leg. Nov. 11, 1887, extirpation of astragalus. Correction, with the very best result.
5. Same. Patient 10 years of age. Equino-varus, left, congenital, very grave. Atrophy of all the muscles of the leg. Extirpation of astragalus, Nov. 20, 1887 (with tenotomy of tendo Achillis). Correction, with very best result. (4 and 5 same sitting.)
6. Same. Patient 3 years of age. Equino-varus, right, congenital, third degree. Dec. 9, 1887, extirpation of astragalus with resection of the plantar aponeurosis. Cure, and correction good. Braces.
7. Same. Patient 3 years of age. Equino-varus, right, congenital, very grave. Jan. 10, 1888, extirpation of astragalus. Issue very favorable.
8. Same. Patient 3 years of age. Equino-varus, left, congenital. Jan. 10, 1888, tenotomy of tendo Achillis and resection of plantar aponeurosis. Issue very favorable. (7 and 8 same sitting.)
9. Same. Patient 7 years of age. Equino-varus, right, congenital, quite marked. Muscular atrophy. Sept. 9, 1886, extirpation of astragalus. Result quite satisfactory; cured in thirty days. Braces.
10. Same. Patient 5 years of age. Equino-varus, right, congenital; treated at home without results. April 2, 1887, extirpation of the astragalus. Correction good; discharged May 9, 1887. Braces.
11. Same. Same patient operated on for equino-varus, left, at same sitting; same result. Braces.
12. Same. Patient 6 years of age. Equino-varus, right, congenital. May 27, 1887, extirpation of astragalus. June 28, 1887, discharged with best results; permanently established a little later.
13. Same. Patient 5 years of age. Equino-varus, left; paralytic attack at two years of age; previous treatment without amelioration. July 5, 1887, extirpation of astragalus. Correction excellent; discharged Aug. 27, 1887.
14. Same. Patient 7 years of age. Equino-varus, left, congenital. Muscular atrophy. July 16, 1887, extirpation of astragalus. Issue again brilliant; cure effected within 26 days. (Same patient as Case 9.)
15. Same. Patient 4 years of age. Equino-varus, right, congenital; no previous treatment. Oct. 10, 1887, extirpation of astragalus. Issue favorable.
16. Same. Patient 11 years of age. Equino-varus, right, congenital, third degree. Nov. 4, 1887, tenotomy of tendo Achillis and resection of plantar aponeurosis, plaster bandages. April 24, 1888, "in view of the unsatisfactory results Dr. Panzeri resolved on subjecting the patient again to a cuneiform tarsotomy." Good correction of the equinism, but the varusism was not sufficiently corrected. Patient discharged cured, dated not stated. Braces.
17. Same. Same patient. Equino-varus, left. Operated on Nov. 9, 1887, Same result. Braces.
18. Same. Patient 11 years of age. Paresis and atrophy of the muscles of the left leg the result of infantile paralysis. March 11, 1888, extirpation of astragalus with section of aponeurosis. As soon as cure permitted she was provided with another brace and given massage, electricity, and passive gymnastics of the affected parts. May 26, 1888, she was in the best condition, not only as to position, but also as to function of the limb. Braces.
19. Same. Patient 8 years of age. Equino-varus, left, paralytic, third degree. Date not given; extirpation of astragalus with section of plantar aponeurosis. July 10, 1888, walked. Good correction. Braces.
20. Same. Patient 13 years of age. Equino-varus, right, grave. June 27, 1888, extirpation of astragalus with section of plantar aponeurosis. Recovered so rapidly and so well that he was discharged on July 17, 1888, cured.
21. Same. Patient 15 years of age. Equino-varus, right, congenital, grave. Date not given, operation at house of Dr. Panzeri; extirpation of astragalus. Excellent correction of deformity and perfect use of limb. Apparently ankle-joint motion.
22. Drs. Augustoni and Panzeri. *Lo Sperimentall*, vol. lix., June, 1887, pp. 569-590. Patient 12 years of age. Equino-varus, left, accidental; considerable diminution of tactile sensibility in foot and leg; apparent dislocation of the fore-foot at every step causing a peculiar lameness. Marked atrophy of extensor and flexor muscles. Oct. 2, 1885, cuneiform tarsotomy with total removal of the astragalus and tenotomy of the tendo Achillis by method of Dr. Little, viz., from within outward. A month later found a perfect cure and an excellent position of foot, and the foot

well united to the leg. Dec. 18, 1885, walked without any pain and without the aid of a stick. April 1, 1887, saw him again and observed perfect function and increase of nutrition of the limbs, and scarcely any perceptible limp. Ankle-joint movement almost normal.

23. Same authors and reference. Patient 9 years of age. Equino-varus, right, congenital. Sept. 15, 1886, cuneiform tarsotomy, removal of about 1 cm. of the malleolus and the entire astragalus and section of aponeurosis. After 46 days cure complete; a well-marked rigidity existed opposite the new articulation of the foot and leg, almost to the degree of true ankylosis; foot had a good position, the sole squarely on the ground. Nov. 25, 1886, walked without any aid; May 15, 1887, improvement maintained; slight limp, but good position of the foot maintained. Braces.

24. Dr. Beauregarde. Inaugural Diss. on the Treatment of Club-foot, 8 Bonn, 1884, p. 46. Patient 9 years of age. Equino-varus, right; unsuccessful tenotomy and orthopedics. April 25, 1882, excision of cuboid bone and section of tendo Achillis and plantar fascia. Entirely corrected; metal suture; Lister dressing; bulk festering. Patient walks with light apparatus which is more for a support to the weak, atrophied, small bones than to hold the foot corrected.

25. Same. Same patient. Equino-varus, left; unsuccessful tenotomy and orthopedics. Same results. Cites Bull. et Mém. de la Soc. de Chir., tome viii. p. 768; also refers to section of Davies-Colley, n. 53.

26. Same operator. Bull. et Mém. de Soc., Paris, 1880 (8), 775. Patient, male, 9 years of age. Equino-varus, left, congenital, severe. Excision of astragalus. Suppuration stopped after 15 days. Walks with a light apparatus. Several tenotomies had been done.

27. Same operator. Paris Thèse, 1889-90, H. le Marc'hadam (cites Société de Chirurgie, 1882). Patient (age not given). Club-foot right, following infantile paralysis. Section of tendo Achillis, aponeurosis, plantaris, and long extensor of big toe.

28. Same operator and reference. Same patient. Club-foot, left, following infantile paralysis. Excision of astragalus, cuboid, and part of the cuneiform. (One of four cases reported by Beauregarde, but no details for the others.)

29. Dr. W. H. Bennett. Trans. Clin. Soc. Lond., 1882, xv., pp. 81-84. Patient, male, 47 years of age. Talipes equino-varus, left, congenital, extreme. Foot so rigid and unyielding that no alteration obtained in shape without a great deal of force; toes could not be moved. June, 30, 1881, excision of wedge from cuboid and scaphoid, and tenotomy. Foot in excellent condition; wound healed July 28th, except a sinus from drainage-tube; Firm bony union. Oct. 6th, patient walked on crutches with foot in a splint; Nov. 21st, foot short, anterior part of sole fairly flat; heel slightly inverted; firm union, not bony; toes can be moved. Straight splint with the foot-piece; wore boots with iron supports. Nov. 3d. No ankle-joint motion as yet. Dressings not changed until July 8th. Carbolic acid caused great irritation, and on Aug. 4th erysipelas set in, cicatrix was opened, all union between bones gave way. Aug. 11th, still no union; healed Sept. 8th; plaster splint applied.

30. Dr. Berger. Bull. et Mém. de la Soc. de Chir. de Paris, 1890, xvi. pp. 55-57. Patient 9 years of age. Equino-varus, right, congenital; varus more marked than equinus; subluxation of forefoot on first range of tarsals. Calcaneum much elongated and frail, and external surface incurvate. Nov. 10, 1889, excision of astragalus through one dorsal incision, and resection of about 2½ cm. of anterior end of calcaneum. Jan. 3, 1890, walked well already. No trace of equinus. Varus has disappeared completely.

31. Same operator and reference. Same patient. Equino-varus, left. Dressings left in place for twenty-one days; wound completely healed.

32. Dr. Boeckel. Patient, male, 4 years of age. Equino-varus, congenital, left. 1882, removal of astragalus. Treated for three months. At seven months walked with apparatus. Plaster support. Tenotomy with apparatus; foot not greatly benefited.

33. Dr. Boeckel. Inaugural Diss. on Treatment of Club-foot, 8 Bonn, 1884. Ed. Springfield. Patient 6 years of age. Equino-varus right; right foot 12 cm. long, left 16 cm. long; previous treatment by tenotomy and orthopedics unsuccessful. June 13, 1878, resection of os cuboid, half of first and second cuneiforms and the third entirely. Coagulation, suppuration; July 17, wound closed. Steps well on foot, but yet shows strong disposition to deformity. May 21, 1883, right foot 13 cm. long, left foot 19 cm. long. Foot firmly fixed and immovable at an angle to leg; in-flexion yet present; calf muscles atrophied. Cites Bull. et Mém. de la Soc. de Chir., tome ix. 332.

34. Same operator and reference. Patient 4 years of age. High degree of congenital club-foot; astragalus is plainly visible before the tibia and forms a sharp protrusion on dorsum of foot. Already had nine months' treatment; section of tendo Achillis, twice done, right foot. May 7, 1879, excision of tarsus. Drainage, suture, Lister dressing; one day of fever. June 10th, good position, stands on entire foot sole, adduction of metatarsus on instep; foot has grown worse. Ankylosis. Apparatus. Ankle-joint motion slight. Cites Bull. et Mém. de la Soc. de Chir., tome ix. 333.

35. Same operator. Inaugural Diss. on Treatment of Club-foot, 8 Bonn, 1884, p. 46. Patient 3½ years of age. Pes varus, right, congenital. Three months of treatment. Better. Cites Bull. et Mém. de la Soc. de Chir., tome ix. p. 333.

36. Same operator and reference. Same patient. Pes varus, left, congenital; three months of treatment, no success; axis of foot makes an angle of 136° with leg. Nov. 28, 1882, excision of tarsus. Foot elevated, drainage, suture, iodoform bandage; severe hemorrhage after removal of Esmarch's bandage; slight suppuration and slight rise of temperature. Jan. 13, 1883, opening of abscess between tibia and tendo Achillis. Feb. 5, 1883, wound nearly closed. March 7, 1883, entirely healed. Patient learned to raise foot in walking in month of March; no shortening in the leg.

37. Same operator and reference. Patient 6 years of age. High degree of club-foot, left; previous treatment by section of tendo Achillis and plaster bandage. Dec. 18, 1882, excision of tarsus, besides possibly a piece 1 cm. long from the exterior malleolus. Jan. 15, 1883, wound healing; 27th, first tried to walk. March 1, 1883, sufficient movement in the tibio-tarsal joint; steps well on sole of foot, but somewhat more on outer edge.

38. Same operator and reference. Patient 6 years of age. High degree of club-foot, left; previous treatment by section of tendo Achillis and plaster bandages. Dec. 12, 1882, excision of tarsus. Foot in good position; plaster bandage.

39. Dr. Bollici. *Archivio di Ortopedia*, Milan, 1888, vol. v. pp. 428-433. Patient 27 years of age. Equino-varus, right, paralytic from five years of age; left also affected, but not operated upon at date of report. Greatly atrophied, especially the thigh. Nov. 29, 1888, subcutaneous tenotomy of tendo Achillis and plantar fascia; excision of astragalus (time of operation about one hour). Seventh day wound cicatrized, bones of leg were found to be "a little indirectly" over the foot; position corrected. 24th day returned to his house. Jan. 7, 1889, position of the foot perfect, "and when erect the sole rested flat," sustaining the weight of the body on the foot without much pain. Used a stick as a support; no braces. No ankle-joint motion.

40. Dr. Boursici, of Bordeaux. *Bull. et Mém. de la Soc. de Chir. de Paris*, 1891, pp. 510-511. Reported by E. Kirnissou. Patient 7 years of age. Talipes equino-varus, right, hereditary congenital; foot making a very open obtuse angle with axis of leg. Intercurrent scarlatina. July 23, 1890, excision of astragalus with subcutaneous section of tendo Achillis and plantar aponeurosis. July 30, 1890, great rise of temperature, scarlatina, abundant suppuration of wound, and persistent fissures. In November healing complete. Braces. Mother and brother had club-feet.

41. Same operator and reference. Same patient. Talipes equino-varus, left, hereditary congenital; foot making a very open obtuse angle with axis of leg. Intercurrent scarlatina. Dec. 12, 1890, excision of astragalus with subcutaneous tenotomy of tendo Achillis and plantar aponeurosis. Cicatrization of tendinous sections by first intention, slight suppuration from astragalus wound. Equinus entirely corrected; slight tendency to varus remains; walks easily without appliances.

42. Dr. Boursier. *Bull. et Mém. de la Soc. de Chir. de Paris*, 1891, xvii. p. 509. Paper by E. Kirnissou. Patient age 25 years. Talipes equino-varus, left, acquired, atrophy from paralysis. April 1st, after electrical treatment for atrophy, subcutaneous tenotomy of tibialis anticus and plantar fascia, and tendo Achillis, and excision of astragalus. Septic conditions; rise of temperature, formation of pus, and purulent fissure. Beginning of June patient began to get up—could stand on ground without pain. Left on Sept. 1st completely cured.

43. Dr. E. H. Bradford. *Boston Med. and Surg. Journ.*, 1888 (117), p. 285. Patient 7 years of age. Equino-varus, right, congenital. Excision of astragalus. Four months later slight valgus. Plaster-of-Paris support. Splint removed in a fortnight, and Taylor's appliance used to retain parts in position.

44. Same operator and reference. Patient, male, 12 years of age. Equino-varus. Excision of astragalus. Good result. Slight inward curvature.

45. Same operator and reference. Patient, male, 10 years of age. Equino-varus, double. Excision of astragalus. Good result. Slight inward curvature.

46. Same operator and reference. Patient, male, 6 years of age. Equino-varus. Excision of astragalus. Good result. Slight inward curvature.

47. Same operator and reference. Patient, male, 10 years of age. Equino-varus. Excision of astragalus. Good result. Slight inward curvature.

48. Same operator and reference. Patient, female, 10 years of age. Equino-varus. Excision of astragalus. Good result. Braces.

49. Same operator and reference. Patient (age not given). Equino-varus, double, congenital. Linear osteotomy of neck of calcaneum and astragalus. Very good results.

50. Same operator and reference. Patient (age not given). Equino-varus. Linear osteotomy of neck of calcaneum and astragalus. Good results.

51. Same operator and reference. Patient (age not given). Equino-varus. Linear osteotomy of neck of calcaneum and astragalus. Good results.

52. Dr. Brinkmann. *Inaugural Diss. on "Resection in Pes Varus Congenitalis"*, 1885, pp. 14-15. Patient 4 years of age. Equino-varus, left, marked; foot shorter than the other; dislocated tarsus felt under the projecting malleolus; projection of internal malleolus and sole of foot bent in a crescent shape. May 17th, excision of astragalus and section of plantar fascia (strongly forced correction) with backward flexion and bandages. June 3d, wound healed by first intention. July 17th, foot perfectly normal.

53. Same operator and reference. Patient 18 years of age. Equino-varus, right varus marked, equinus slight; tenotomy done several times in fourth and fifth year without success. Cuneiform tarsotomy of fore part of calcaneum and almost all of cuboid. Normal reduction still very difficult; eczema appeared and spread over foot and leg, but healed in five or six days; wound healed in three weeks. Imperfect use of foot. Plaster-of-Paris support.

54. Same operator and reference. Patient $1\frac{1}{2}$ years of age. Equino varus, right, third stage; walking impossible; strong projection of ant. calcaneum process and of the astragalus, which was greatly deformed; plantar fascia and tendo Achillis very much strained. Excision of astragalus and cuboid bone, with tenotomy of tendo Achillis. Patient began to get up in three weeks.

55. Same operator. Same patient. Equino-varus, left, third stage. Operation and results the same.

56. Dr. Brinkmann. *Aerztlicher Bericht k. k. Allg. Krankenhaus zu Wien*, 1882, iv. p. 248. Patient 33 years of age. Talipes-equinus, right, accidental. Fracture of ankle-joint; constantly ulcerating scar. Cuneiform osteotomy in Chopart's articulation. Good results.

57. Same operator. *Ibid.*, p. 250. Patient 28 years of age. Talipes equino-varus, right from paralysis. Cuneiform tarsotomy in Chopart's articulation. Foot in excellent position. Deformity recurred through unequal muscular tension.

58. Same operator and patient. Talipes equino-varus, left, from paralysis. Forceful replacement and application of plaster bandage. Foot in excellent position. Deformity occurred through unequal muscular tension.

59. Wm. Bryant. *Medical Times and Gaz.*, London, 1878, ii, 682. Patient, male, 10 years of age. Talipes equino-varus, right; extreme head of astragalus protruded on outside of foot, cuboid also prominent. Several swellings on outer side from pressure; tendo Achillis and anterior and posterior tibialis tense, and muscles of calf wasted. June 18, 1878, V-shaped piece removed from outer side scaphoid, greater part of cuboid, and articular surface of os calcis, astragalus and one cuneiform bone; two skin incisions were made, one on outer side for two inches, the other perpendicular to the first and extending from the dorsum to the side. July 11th, foot in good position; Aug. 20th, some tenderness in the sole. Nov. 25th, wounds quite healed, can put sole fairly and evenly on the ground; increased mobility in metatarso-phalangeal joints; foot now but little deformed. Ordinary side splint; July 14th, a back splint with foot-piece put on; July 11th, talipes splint; Aug. 20th, splint taken off; Sept. 14th, foot put in plaster-of-Paris. Ankle-joint somewhat mobile. Previous operations of tenotomy. In Oct., 1878, patient returned and had tendo Achillis divided; wound had not then healed and there were some prominent granulations on outer side.

60. Dr. Burrell. Not published. Patient 3½ years of age. Talipes equino-varus, right, grave. March 9, 1891, excision of astragalus, open tenotomy of tendo Achillis, and forcible correction with Bradford's twister. Good position, normal motion at ankle-joint. Seen two years afterward; foot in perfect position. Plaster bandages. Ankle-joint motion. Patient has not consulted physician regularly.

61. Same operator. Same patient. Talipes equino-varus, left, congenital, grave. March 9, 1891, excision of astragalus, open section of tendo Achillis and plantar fascia. Slight tendency to varus, equinus corrected. Two years afterward slight tendency to varus, equinus corrected. Taylor's club-foot shoe with uprights extending to the pelvis. Ankle-joint motion.

62. Same operator. Patient 9½ years of age. Talipes equino-varus, right, congenital, very severe. Oct. 5, 1892, excision of head of astragalus, open section of tendo Achillis and plantar fascia, and position corrected by means of Thomas's wrench. Slight tendency to varus, but equinus corrected. Five months afterward some tendency to varus. Taylor's shoe with upright reaching to pelvis. Normal motion at ankle-joint.

63. Same operator. Same patient. Talipes equino-varus, left, congenital, very severe. Oct. 5, 1892, section of tendo Achillis one inch above insertion and division of plantar fascia after superficial dissection of the skin, and corrected position by Thomas's wrench. Slight equinus, varus corrected. Five months afterward, normal position; slight varus easily corrected by manipulations. Plaster bandages. Normal motion of ankle-joint.

64. Dr. P. V. Butz. *Chir. Vestnik, Surg. Messenger, St. Petersburg*, vol. v. pp. 550-551. Patient 28 years of age. Equino-varus, slight swelling in ankle first noticed at sixteen years of age. Poorly nourished. Oct. 15, 1887 (o.s.), osteoplastic resection of tarsus by method of Vladmiroff and Mickulicz. The disease being over twelve years' standing, the wound was over sixty days in casting off the diseased material and in cicatrizing. In 2½ months patient walked with crutches, stepped without pain; in 3½ months walked with a stick alone; in 4½ months walked easily and rapidly without stick, wearing a boot with steel side strips; cicatrix not sensitive, can walk barefooted without supports; discharged March 26, 1888. Light ankle-joint motion. Vladmiroff's operation, reported in his dissertation, Kazan, "Several Osteoplastic Operations on the Foot." Resection of articular portions of tibia and fibula and posterior surfaces of the scaphoid and cuboid. For Miculicz's system see *Archives f. Chir.*, xxvi. p. 497.

65. Dr. L. Championnière. Thesis for the Doctorate of Medicine (Faculté de Méd. de Paris), 1889, by J. Martin. Patient 18 years of age. Equino-varus, left, very marked, paralytic. Marked muscular atrophy; leg not atrophied. June 2, 1883, excision of astragalus and section of tendo Achillis. Equinus corrected, but the varus redressed with difficulty. Oct. 20th, left the hospital, walked with a brace. Braces. Patient abandoned the brace in following May, but in 1888 broke the leg by a fall from a carriage, and had to resume it.

66. Same operator and reference. Patient 18 years of age. Equino-varus, paralytic; deformity considerable and almost entirely equinus; foot only reaches ground at extremity of first metatarsal and little toe; can only progress by leaping. Convulsions at three years, and paralysis of muscles of leg. April 26, 1888, external incision before the malleolus and then internal incision outside of anterior tibial tendon; operation laborious, especially in the disengagement of the astragalus post.; Esmarch's bandage used, open section of tendo Achillis. March 3, 1889, walked easily; carries the foot quite flatly. Braces.

67. Same operator. *Bull. et Mém. de la Soc. de Chir. de Paris*, 1890, xvi. p. 96. Patient 15 years of age. Double club-foot. May 12, 1887, excision of right astragalus. A chloroform accident, artificial respiration; reunion without suppuration; fair result. Discharged March 4, 1888.

68. Same operator and reference. Patient 15 years of age. Equino-varus, left, paralytic (very painful in walking). Sept. 6, 1888, excision of astragalus with section of tendo Achillis (Esmarch's bandage used. Left hospital Oct. 29th; results immediately good.

69. Same operator and reference. Patient 9 years of age. Paralytic equino-varus, left. May 9, 1888, excision of astragalus and section of tendo Achillis. Drainage; union by first intention. Sept. 1, 1889, result excellent, walks and runs with ease. Light lateral braces.

70. Same operator and reference. Patient 15 years of age. Equino-varus of right foot. Sept. 12, 1889, excision of astragalus and section of tendo Achillis. Discharged Nov. 12th, in very good condition; walks straight and almost without limping. Shoe and braces.

71. Same operator. *Ibid.* 1891, xvii. p. 512. Patient 15 years of age. Talipes valgus. Rheumatic and cardiac complications. Excision of astragalus, April 11, 1890. Form of foot restored; painfulness relieved, but functional results not good because of the obstinacy of the patient, he refusing exercises, etc. Braces.

72. Same operator and reference. Patient 18 years of age. Talipes valgus. Excision of astragalus, July 31, 1890.

73. Same operator. Paris Thesis (cites Bull. et Mém. de Soc. de Chir.). Patient 20 years of age. Equino-varus, right foot smaller than left; equinus marked. Began at 13 months, after an attack of convulsions; muscles of leg atrophied, especially the *gastrocnemii* and soleus. July 26, 1888, excision of astragalus, section of ligamentum talo-naviculare and lig. cruciatum cruris (sig. en X), open tenotomy of tendo Achillis and excision of cuboid. Marked varus remains, but results were quite good and no pain or febrile reaction. Left in good condition; sole of foot placed well on the ground; no more equinus or varus; walking is easy and not painful. Ankle-joint motion.

74. Same operator. Paris Thesis, 1889-90, II. le Marc'hadam. Patient 10 years of age. Equino-varus paralytic; varus slight but equinus marked. Very marked atrophy of muscles of the calf. May 9, 1888, excision of astragalus and cuboid. No suffering after operation; first attempt at walking not painful. A year and a half later: walking easy and absolutely correct; can run and jump the rope, and all without apparatus; muscles recuperating.

75. Same operator. Bull. et Mém. de la Soc. de Chir. de Paris, 1890, xvi. p. 89. Patient 19 years of age. Equino-varus, right, following infantile paralysis; very marked. Atrophy of muscles of leg. June 21, 1889, excision of astragalus, cuboid, scaphoid, and anterior half of calcaneum; open tenotomy of tendo Achillis. Suffering for four or five days, but no rise of temperature; six weeks later foot solid enough to sustain weight of body, in perfect shape, and a shoe with lateral supports was put on for prudence. Two months after operation walks perfectly without the shoe, sole well placed on the ground; muscles slowly regaining strength.

76. Dr. E. Charon. Journ. de Méd. de Chir. et de Pharm. Brnssels, 1888, vol. lxxxvi. p. 267. Patient 6 years of age. Equino-varus. Atrophy from disuse. 1885, Dr. Gross's (of Nancy) operation was done: excision of astragalus from right side, resection of external malleolus and a portion of the os calcis. Foot was not even helped.

77. Same operator. "Chirurgie Infantile," Brnssels, Lamartin, ed. 1891, p. 36. Patient 6 years of age. Equino-varus. Extirpation of astragalus, resection of external malleolus. Excellent result. Braces. Ankle-joint motion.

78. Same operator. Ibid. p. 299. Patient 4 years of age. Equino-varus. Extirpation of astragalus. Perfect correction. Five months after result satisfactory. Braces.

79. Same operator. Du Traitement Chirurgical des Pieds Bots Congenit., Brussels, 1891, p. 7. Patient 10 years of age. Equino-varus. Extirpation of astragalus. Perfect correction. Walks easily on the entire plantar surface of foot. Braces.

80. Same operator. Journ. de Méd., de Chir., de Pharm., Brussels, 1888, vol. lxxxvi. p. 257. Patient 9 years of age. Equino-varus, right. March 20, 1888, excision of astragalus. April 9th, foot at a right angle in plaster bandage; May 8th, walks with ease upon the sole of the foot, no lameness, serous bursa disappears. Braces.

81. Dr. J. M. Cotterill. Trans. Clin. Soc. Lond., and Edinb. Med. Journ., 1884-5. Woman. Talipes equino-varus. Excision of cuboid and external cuneiform. Weight and pulley. Cured.

82. Mr. Croft. Med. Times and Gaz., Lond., 1883. Patient, female, 8 years of age. Equino-varus, right, congenital, rigid, inversion of foot, fibula back of tibia, $2\frac{1}{2}$ inches shortening in the leg. Muscular atrophy. July 1, 1882, removal of parts of scaphoid, internal and middle cuneiform bones and cuboid. Healed in three weeks; placed sole of foot on floor in four weeks. Discharged August 1, 1883.

83. Same operator and reference. Patient, male, 12 years of age. Equino-varus, congenital, foot rigid. Date not stated; excised a wedge of bone from tarsus. Healed in three weeks. Wore boot with iron supports for six months. Child sat up July 4th; wound healed and child discharged on July 22d.

84. Dr. B. F. Curtis. Unpublished. Patient about 3 years of age. Equino-varus. Excision of astragalus. Practical correction. One year after front of foot tended to adduct, but sole was flat. Judson's brace. Ankle-joint motion. Case had previously been treated by hand-stretching, brace-stretching, tenotomy, and Phelps's operation.

85. Dr. G. G. Davis. N. Y. Med. Journ., Oct. 1, 1892. Patient 12 years of age. Equino-varus, right, congenital, sole vertical and turned inward at 90° to ant. post. axis. About Dec. 1891, anterior section through cuboid and cuneiform. Posterior section through neck of astragalus, and anterior part of os calcis. Absolute correction; sole flat on ground in its whole extent. Eight months later foot in excellent position, no pain or trouble in any way. Braces used. Ankle-joint motion about 10° or 15° .

86. Same operator and reference. Patient 21 years of age. Equino-varus, right, sole vertical, and rotated in 90° . Excision of three cuneiforms, cuboid, scaphoid, astragalus, and anterior part of os calcis. Foot short but in excellent position; sole flat on ground. Thirteen months later most excellent; walks without brace, and foot in excellent position. Braces used. Ankle-joint motion about 10° . A very marked case, and very gratifying result. Shortening of foot was considerable, but straightening could not be done without it.

87. Same operator. N. Y. Med. Journ., October 1, 1892. Patient 21 years of age. Equino-varus, right, congenital, sole vertical and foot turned inward at 90° to anterior-posterior axis. No complications. Excision of tarsus from metatarsals in front to line drawn through neck of astragalus and anterior part of os calcis in front of ankle-joint and section of tendo Achillis and plantar fascia. Excellent results; perfect reposition. Six months later walking much improved; no pain. Braces required. About 15° of motion.

88. Same operator and reference. Same patient. Equino-varus, left, congenital, sole vertical and foot turned inward at 90° to anterior-posterior axis. No complications. Excision of tarsus from metatarsals in front to a line drawn through neck of astragalus and anterior part of os calcis in front of ankle-joint, with section of tendo Achillis and plantar fascia. Excellent results; perfect reposition. Six months later walking much improved; no pain. Small sinus existed from which a small spicule of bone was discharged. Braces required. About 15° of motion.

89. Dr. Davies-Colley. Bryant's Surgery. Patient, male, 12 years of age. Equino-varus, right. June 18, 1878, excision of astragalus, scaphoid, calcaneus cuneiform and cnoid. July 11th, bones fairly united, wound nearly closed. September 10th, sole of foot flat. November 10th, can walk fairly well. Distal splint and limb swinging. Temperature went up to 102.4° next day, fell day after. Immoveable splint applied September 10th. Boy returned October 20th to have tendo Achillis cut and more motion at ankle-joint obtained.

90. Dr. R. Davy. British Med. Journ., London, 1883, p. 899. Patient, male, 15 years of age. Talipes varus, left, congenital. January 27, 1874, excision of cnoid. Discharged May 27, 1874. Plaster-of-Paris with flat steel sole under plaster. Recovery.

91. Same operator and reference. Same patient. Talipes varus, right, congenital. March 17, 1874, excision of cuboid. Discharged May 27, 1874. Plaster-of-Paris with flat steel sole under plaster. Recovery.

92. Same operator and reference. Patient, male, 14 years of age. Equino-varus, right. January 18, 1875, excision of cnoid. Discharged April 11, 1875. Plaster-of-Paris with flat steel sole under plaster. Recovery.

93. Same operator and reference. Patient 10 years of age. Equino-varus, right. January 26, 1875, excision of cuboid. Discharged May 26, 1875. Plaster-of-Paris with flat steel sole under plaster. Recovery.

94. Same operator and reference. Same patient. Equino-varus, left. January 26, 1875, excision of cnoid. Discharged May 26, 1875. Plaster-of-Paris with flat steel sole under plaster. Recovery.

95. Same operator and reference. Patient, male, 6 years of age. Equino-varus, left. March 28, 1876, excision of osseous wedge at trans tarsal joint. Discharged May 22, 1876. Plaster-of-Paris with flat steel sole under plaster. Recovery.

96. Same operator and reference. Patient, male, 12 years of age. Equino-varus, right. November 4, 1876, excision of osseous wedge at trans tarsal joint. Discharged May 21, 1877. Plaster-of-Paris with flat steel sole under plaster. Recovery.

97. Same operator and reference. Same patient. Equino-varus, left. January 16, 1877, excision of osseous wedge at trans tarsal joint. Discharged May 21, 1877. Plaster-of-Paris with flat steel sole under plaster. Recovery.

98. Same operator and reference. Patient, female, 1 $\frac{1}{4}$ years of age. Equino-varus, right. March 5, 1878, excision of osseous wedge at trans tarsal joint. Discharged April 12, 1878. Plaster-of-Paris with flat steel sole under plaster. Recovery—38 days in hospital.

99. Same operator and reference. Patient, male, 20 years of age. Talipes equinus, left. November 2, 1877, excision of dorsal wedge. Discharged December 5, 1877. Plaster-of-Paris with flat steel sole under plaster. Death in 14 days from septicæmia.

100. Same operator and reference. Patient, male, 16 years of age. Congenital; equino-varus, right. May 31, 1878, excision of wedge at trans tarsal joint. Discharged August 29, 1878. Plaster-of-Paris with flat steel sole under plaster. Recovery.

101. Same operator and reference. Patient, male, 14 years of age. Equino-varus, left. May 25, 1878, excision of wedge at trans tarsal joint. Discharged July 31, 1878. Plaster-of-Paris with flat steel sole under plaster. Recovery.

102. Same operator and reference. Patient, male, 10 years of age. Varus, right. July 8, 1879, excision of wedge at trans tarsal joint. Discharged September 9, 1879. Plaster-of-Paris with flat steel sole under plaster. Recovery.

103. Same operator and reference. Patient, male, 4 years of age. Varus, left. June 7, 1881, excision of wedge at trans tarsal joint. Discharged July 22, 1881. Plaster-of-Paris with flat steel sole under plaster. Recovery.

104. Same operator and reference. Patient, male, 10 years of age. Paralytic equino-varus, right. June 14 1881, excision of wedge at trans tarsal joint. Discharged July 9, 1881. Plaster-of-Paris with flat steel sole under plaster. Recovery.

105. Same operator and reference. Patient, male, 11 years of age. Equino-varus, right. August 4, 1881, excision of wedge at trans tarsal joint. Discharged October 21, 1881. Plaster bandage with steel sole under the plaster. Recovery.

106. Same operator and reference. Patient, male, 5 years of age. Talipes varus, right. November 29, 1881, excision of wedge at trans tarsal joint. Discharged February 13, 1882. Plaster bandage with steel sole under the plaster. Recovery.

107. Same operator and reference. Patient, female, 4 years of age. Congenital varus, right. March 31, 1882, trans tarsal joint excised. Discharged June 1, 1882. Plaster bandage with steel sole under the plaster. Recovery.

108. Same operator and reference. Same patient. Maldevelopment, left. March 31, 1882, trans tarsal joint excised. Discharged June 1, 1882. Plaster bandage with steel sole under the plaster. Recovery.

109. Same operator and reference. Patient, female, 13 years of age. Equino-varus, left. June 6 1882, excision of wedge at trans tarsal joint. Discharged September 9, 1882. Plaster bandage with steel sole under the plaster. Recovery.

110. Same operator and reference. Patient, male, 13 $\frac{1}{2}$ years of age. Congenital varus, double. June 20, 1882, excision of wedge at trans tarsal joint. Discharged August 21, 1882. Plaster bandage with steel sole under the plaster. Recovery.

111. Same operator and reference. Patient, male, 10 years of age. Congenital equino-varus, left. June 26, 1883, trans tarsal joint excised. Discharged December 19, 1883. Plaster bandage with steel sole under the plaster. Recovery; 175 days in hospital.

112. Same operator and reference. Patient, male, 7 years of age. Congenital equino-varus, right. July 10, 1883, excision of transtarsal joint. Discharged October 19, 1883. Plaster bandage with steel sole under the bandage. Recovery.
113. Same operator and reference. Patient, female, 4 years of age. Congenital equino-varus, right. November 20, 1883, excision of transtarsal joint. Discharged March 21, 1884. Plaster bandage with steel sole under the plaster. Recovery.
114. Same operator and reference. Patient, male, 18 years of age. Congenital equino-varus, left. Toes upside down. January 11, 1884, excision of rectangular wedge at transtarsal joint. Discharged March 21, 1884. Plaster bandage with steel sole under the plaster. Recovery.
115. Dr. Deschamps. Unpublished. Patient $4\frac{1}{2}$ years of age. Equino-varus. No complications. 1885, excision of astragalus. Good results five months later. Barwell's apparatus. Slight ankle-joint motion.
116. Same operator. Patient 4 years of age. Equino-varus. No complications. 1886, excision of astragalus. Good results five months later. Slight ankle-joint motion.
117. Same operator. In Dunulleno, *Traitement des Deformities Congenitales*. Patient 14 years of age. Equino-varus. No complications. 1886, excision of astragalus. Good results. Slight ankle-joint motion. Died 3 years later of consumption.
118. Same operator. Patient 4 years of age. Equino-varus. 1887, excision of astragalus. Bad results. Sayre's apparatus. Ankylosis.
119. Same operator. Patient 5 years of age. Equino-varus. 1887, excision of astragalus. Good results. Slight ankle-joint motion.
120. Same operator. Patient 7 years of age. Equino-varus. 1887, excision of astragalus. Good results 4 years later. Slight ankle-joint motion.
121. Same operator. Patient $5\frac{1}{2}$ years of age. Equino-varus. 1887, excision of astragalus. Good results. Slight ankle-joint motion.
122. Same operator. Patient 6 years of age. Equino-varus. 1887, excision of astragalus. Good results. Slight ankle-joint motion.
123. Same operator. Patient $7\frac{1}{2}$ years of age. Equino-varus. 1887, excision of astragalus. Good results. Slight ankle-joint motion.
124. Same operator. Patient 10 years of age. Equino-varus. 1888, excision of astragalus. Satisfactory results. Nélaton's apparatus. Ankylosis.
125. Same operator. Patient 14 years of age. Equino-varus. 1888, excision of astragalus. Good results. Barwell's apparatus. Slight ankle-joint motion.
126. Same operator. Patient 12 years of age. Equino-varus. 1888, excision of astragalus. Good results 2 years after. Slight ankle-joint motion.
127. Same operator. Patient $13\frac{1}{2}$ years of age. Equino-varus. 1889, excision of astragalus. Bad results. Sayre's apparatus. Ankylosis.
128. Same operator. Patient 9 years of age. Equino-varus. 1890, excision of astragalus. Good results. Barwell's apparatus. Ankle-joint motion.
129. Same operator. Patient 6 years of age. Equino-varus. 1890, excision of astragalus. Slight ankle-joint motion.
130. Same operator. Patient $6\frac{1}{2}$ years of age. Varus. 1891, excision of astragalus. Slight ankle-joint motion.
131. Same operator. In Dunulleno, *Traitement des Deformities Congenitales du Pied*. Patient 21 years of age. Valgus acquired. 1887, osteotomy of fibula and cuneiform osteotomy of the ant. ankle cone. Good results 2 years after. Ankle-joint motion. Died $2\frac{1}{2}$ years later of consumption.
132. Same operator. Patient 7 years of age. Equino-varus. 1887, cuneiform osteotomy. Good results 3 years later. Ankle-joint motion.
133. Same operator. Patient 6 years of age. Equino-varus. 1888, cuneiform osteotomy. Good results. Ankle-joint motion.
134. Same operator. Patient $6\frac{1}{2}$ years of age. Equino-varus. 1889, cuneiform osteotomy. Good results. Ankle-joint motion.
135. Same operator. Patient 6 years of age. Equino-varus. 1890, cuneiform osteotomy. Satisfactory results. Sayre's apparatus. Slight ankle-joint motion.
136. Same operator. Patient 5 years of age. Equino-varus. 1893, cuneiform osteotomy. Good results. Ankylosis.
137. Same operator. *Gazette Medicale de Liège*. Patient 7 years of age. Equino-varus, paralytic. 1889, arthrodesis. Good results. Ankylosis.
138. Same operator and reference. Patient $9\frac{1}{2}$ years of age. Equino-varus. 1888, arthrodesis. Good results. Ankylosis.
139. Same operator. Patient 6 years of age. Equino-varus, paralytic. 1888, arthrodesis. Good results. Ankylosis.
140. Same operator. Patient 5 years of age. Equino-varus. 1889, arthrodesis. Good results 2 years after. Ankylosis.
141. Same operator. Patient 5 years of age. Equino-varus. 1890, arthrodesis. Good results 1 year after. Ankylosis.
142. Same operator. Patient 7 years of age. Equino-varus. 1891, arthrodesis. Good results. Ankylosis.

143. Same operator. Patient 18 years of age. Valgus; pain. 1885, excision of scaphoid. Good results. Ankle-joint motion.
144. Same operator. Patient 8 years of age. Valgus; pain. 1886, excision of scaphoid. Good results. Ankle-joint motion.
145. Same operator. Patient 9 years of age. Valgus; pain. 1889, excision of scaphoid. Good results. Ankle-joint motion.
146. Same operator. Bulletins de l'Academie. Patient 2 years of age. Equino-varus. 1888, Phelps' operation. Good results. Sayre's apparatus. Ankle-joint motion.
147. Same operator and reference. Patient 10 years of age. Equino-varus. 1888, Phelps' operation. Good results 3 years after. Ankle-joint motion.
148. Same operator and reference. Patient 7 years of age. Equino-varus. 1889, Phelps' operation. Good results. Ankle-joint motion.
149. Same operator and reference. Patient 2½ years of age. Equino-varus. 1889, Phelps' operation. Good results. Ankle-joint motion.
150. Same operator. Patient 2 years of age. Equino-varus. 1890, Phelps' operation. Good results 2 years after. Ankle-joint motion.
151. Same operator. Patient 4 years of age. Equino-varus. 1890, Phelps' operation. Satisfactory results. Plaster-of-Paris. Ankle-joint motion.
152. Same operator. Patient 7 years of age. Equino-varus. 1890, Phelps' operation. Good results. Ankle-joint motion.
153. Same operator. Patient 9 years of age. Equino-varus. 1891, Phelps' operation. Good results. Ankle-joint motion.
154. Same operator. Patient 8 years of age. Equino-varus. 1892, Phelps' operation. Good results. Ankle-joint motion.
155. Same operator. Patient 1 year of age. Equino-varus. 1893, Phelps' operation. Good results. Ankle-joint motion.
156. Same operator. Bulletins de l'Academie. Patient 10 years of age. Equino-varus. 1888, Reeves's operation. Good results. Ankle-joint motion.
157. Same operator and reference. Patient 5 years of age. Equino-varus. 1889, Reeves's operation. Good results. Ankle-joint motion.
158. Same operator and reference. Patient 3½ years of age. Equino-varus. 1889, Reeves's operation. Good results 2 years later. Ankle-joint motion.
159. Same operator. Patient 6 years of age. Equino-varus. 1890, Reeves's operation. Good results 2 years later. Ankle-joint motion.
160. Same operator. Patient 7 years of age. Equino-varus. 1890, Reeves's operation. Good results 2 years later. Plaster-of-Paris. Ankle-joint motion.
161. Same operator. Patient 3 years of age. Equino-varus. 1891, Reeves's operation. Good results 2 years later. Ankle-joint motion.
162. Same operator. Dr. Meillem Traitement des Deformities Cong. du Pied. Dr. J. Deschamps, Liège, 1889, No. 40. Patient 14 years of age. Equino-varus, right. Excision of astragalus and cuboid, and resection of anterior part of calcaneum. Straightening imperfect until after ablation of cuboid, then complete. Foot perfectly restored, but short; slight equinus remains. Braces.
163. Dr. Dumont (cited from Schwartz Thesis). Paris Thesis, 1889-90, H. le Marc'hadam. Patient 9 years of age. Equino-varus, marked. Ablation of astragalus. Results satisfactory.
164. Same operator and reference. Patient 33 years of age. Equino-varus. Ablation of astragalus. Results satisfactory; marked lameness remains.
165. Dr. Duret. Bull. et Mém. de la Soc. de Chir. de Paris, xiii., 1887, p. 694; reported by M. Polakien. Patient 6 years of age. Equino-varus, right, congenital, and paralytic scaphoids greatly atrophied. Atrophy of muscles very marked. Tenotomy of tendo Achillis and retracted muscles; excision of anterior two-thirds of cuboid, part of head of astragalus, and parts of two cuneiforms (2d and 3d). Three months later foot rests on sole in walking, heel lowered, foot straight. Braces.
166. Same operator and reference. Same patient. Equino-varus, left, congenital and paralytic scaphoids greatly atrophied. Marked atrophy of muscles. Excision of anterior two-thirds of cuboid, part of head of astragalus, and parts of 2d and 3d cuneiforms; tenotomy of tendo Achillis and retracted tendons. Three months later not so good as the other one; uses appliances but can walk without them.
167. Dr. F. R. Fairbank. Brit. Med. Journ., Lond., 1887-78, ii., p. 933. Patient 41 years of age. Equino-varus, left, deformity extreme. April 15, 1887, excision of tarsal bones and section of tendo Achillis and plantar fascia; side incisions. Long and tedious recovery because of suppuration and bronchial trouble. Foot short but firm; good bony union. Plaster-of-Paris splint. Walks well and easily and works steadily.
168. Same operator and reference. Same patient. Equino-varus, right, deformity extreme. November, 1887, excision of tarsals and section of tendo Achillis and plantar fascia (modified Davies-Colley's operation); side incision for excision. Wound healed slowly. Foot short but firm and strong and quite straight; walks without support. Discharged February 6, 1888. January 4, 1888, plaster put on with a fenestrum over the wound. Can walk several miles without fatigue or pain.
169. Dr. Ferrier. Thesis for the Doctorate of Med., Faculty de Med., Paris, 1889, by J. Martin. Patient 6 years of age. Equino-varus. Excision of astragalus. Second operation required; result unsatisfactory.

170. Trois Fontaines. *Annales de la Société Médico-Chirurgicale de Liège*, 1884, p. 274. Patient 9 years of age. Equino-varus. Cuneiform osteotomy of tarsus. Satisfactory results within 2 months. Excellent result 9 years after. Braces for 2 months. Limited flexion but complete extension to normal degree.

171. Dr. G. R. Fowler. Patient 7 years of age. Equino-varus, right, extreme. March, 1886, excision of cuboid and parts of cuneiform, scaphoid and astragalus. Complete restoration. Four months later, very good position. Braces as a preventive. Ankle-joint motion.

172. Same operator. Same patient. Equino-varus, left, extreme. March, 1886, excision of cuboid and parts of cuneiform (ext and mid.), scaphoid and astragalus. Complete restoration. Four months later, very good position. Braces as a preventive. Ankle-joint motion.

173. Same operator. Patient 6 years of age. Equino-varus, right, extreme. November, 1887, excision of cuboid and portions of external and middle cuneiforms, scaphoid and astragalus. Complete restoration. Three months later an extensive bony deposit at site of operation caused inversion; removed, and three months later a similar deposit again occurred, but not so extensive. Braces to maintain position. Ankle-joint motion.

174. Same operator. Same patient. Equino-varus, left, extreme. November, 1887, excision of cuboid and portions of external and middle cuneiforms, scaphoid and astragalus, by Phelps's operation. Complete restoration. Braces to maintain position. Ankle-joint motion.

175. Same operator. Patient 5 years of age. Equino-varus, left. February, 1889, excision of cuboid and parts of external and middle cuneiforms and astragalus. Complete restoration. Four and a half months later, bony deposits very marked at site of operation. Plaster-of-Paris for two months, but no brace. Ankle-joint motion.

176. Same operator. Same patient. Equino-varus, right, varus more marked. February, 1889, excision of cuboid and Phelps's incision added. Complete restoration. Four and a half months later, marked bony deposits at site of operation. Plaster-of-Paris for two months, but no brace. Ankle-joint motion.

177. V. P. Gibney. *Boston Med. and Surg. Journ.*, 1890, cxx., 278. *N. Y. Acad. of Med.* Patient, female, 25 years of age. Equino-varus, right; usual force unsuccessful. Dec. 26, 1887, cuneiform osteotomy. Septicæmia until Feb. 16th. Feb. 16th, wounds healing nicely, and foot in excellent position; walks quite well. Thomas's club-shoe over plaster of Paris. After section of bones and free division of deltoid lig. and plantar fascia, it was impossible to straighten foot, so free lateral incisions were made through muscles and tendons after Phelps.

178. Same operator and reference. Same patient. Equino-varus, left (same as above). Feb. 22, 1888, cuneiform osteotomy. Healing by first intention. Good result. Plaster-of-Paris support.

179. Same operator. *Annals of Surgery*, St. Louis, 1890, ii p. 324. Patient, female, 32 years of age. Equino-varus, right, extreme. Dec. 26, 1887, two wedges removed, section of deltoid and astragalus, scaphoid, lig. and plantar fascia and muscles after Phelps. Wound healed rapidly, and by Jan. 16th foot in excellent position. Walks with difficulty. Thomas club-shoe and plaster-of-Paris support. Tenotomy had been done frequently when a child; septicæmia set in and temperature reached 106°. Fistulæ in both feet and pieces of bone discharged. Now an organist, but sole of feet very tender.

180. Same operator and reference. Same patient. Equino-varus, left, extreme. Feb. 22, 1888 removal of wedges. Healing by first intention.

181. Same operator and reference. Patient a boy. Double equino-varus. May 16, 1886, operation, and other foot six months later. Walks in ordinary shoes. Good recovery and excellent shape.

182. Same operator. *Boston Med. and Surg. Journ.*, 1890, p. 278. Patient 8 years of age. Equino-varus. V-shaped section of the tarsus. Deformity corrected. Five months later foot in good position; sinus remained, but healed after a spicule of bone came away. Ankle-joint motion fair.

183. Dr. Gillette. Not published. Patient 11 years of age. Equino-varus. Excision of head of astragalus and section of tendo Achillis and plantar fascia. Foot in fair position; suppurating wound. One year later foot quite flat. Slight ankle-joint motion. Child had scarlet fever one week after operation, which probably delayed healing.

184. Same operator. Patient about 11 years of age. Equino-varus. Scars from previous operations. Excision of head of astragalus. Six months later foot in good position; sole fairly on ground. Plaster-of-Paris support. Ankle-joint motion very slight.

185. Dr. Goldschmidt. Not published. Severe equino-varus. Excision of cuboid and astragalus. Three years later, walked lame and with marked bellow in foot, but no pain.

186. Dr. H. E. Goodman. Not reported. Patient 12 years of age. Equino-varus, left; equinus not marked. About Dec., 1891, excision of astragalus. Varus corrected; instep quite arched, and sole quite hollow. Eight months later, useful foot and no pain; marked arching of instep. Braces used. Ankle-joint motion about 10° or 15°.

187. Dr. Nich. Grattan. *Brit. Med. Journ.*, Lond., 1891, i. 961. Patient 6 years of age. Equino-varus, right; foot rests flat on the ground; equinus not marked. Operated upon; did well. Previous tendency to relapse by elastic cord secured by adhesive plaster.

188. Same operator and reference. Patient 6 years of age. Equino-varus, left; same as above. Osteoclasia of tibia and fibula close to ankle-joint and at junction of middle and lower thirds. Ten days later leg put in a corrected position. Six weeks later fracture united; foot flat on the ground, but inverted. Posterior iron splint support.

189. Same operator and reference. Patient, male, 9 years of age. Equino-varus, right, severe. March 19, 1892, excision of astragalus. Recovery good. Ankle-joint motion. Refused further treatment.

190. Same operator and reference. Same patient. Equino-varus, left, severe. July 4, 1892, excision of astragalus. Recovery good.

191. Same operator and reference. Patient, male, $1\frac{1}{2}$ years of age. Equino-varus, right. July 21, 1892, excision of astragalus. Wound healed. April 20, 1893, position good, but tendency to relapse. Rubber muscle supports. Ankle-joint motion.
192. Same operator and reference. Same patient. Equino-varus, left. Nov. 18, 1892, excision of astragalus. Wound healed. Ankle-joint motion.
193. Same operator. Patient, male, aged 2 months. February 11, 1893, osteoclasia, section of tendo Achillis. Under treatment. Plaster-of-Paris.
194. Same operator. Patient, male, 8 years of age. Club-foot, right tenotomy several times without success. August 18, 1889, excision of astragalus. Very good results. Walking power very good. Good ankle-joint motion. Osteoclasia done November 18, 1890; January 31, 1891; April 4, 1891.
195. Same operator. Same patient. Club-foot, left. August 18, 1889, excision of astragalus. Very good results. Walking power very good. Good ankle-joint motion.
196. Same operator. Patient, female, 10 years of age. Club-foot, left. September 1, 1890, excised astragalus. January, 1893, tendency to relapse. Perfect ankle-joint motion. Osteoclasia December 2, 1890.
197. Same operator. Patient, female, $2\frac{1}{2}$ years of age. Equino-varus, right. March 1, 1890, excision of astragalus. Good results. Good ankle-joint motion. Osteoclasia January, 1891.
198. Same operator. Same patient. Equino-varus left. March 1, 1890, excision of astragalus. Good results. Jan., 1893, walking very good. Good ankle-joint motion. Osteoclasia, Feb. 26, 1892.
199. Same operator. Patient, male, 3 years of age. Equino-varus, left. March 9, 1891, excision of astragalus. Good recovery. April 1, 1893, recovery good; walks fairly well; sent home. Ankle-joint motion good. May 19, 1891, osteoclasia, and again Jan. 28, 1893.
200. Same operator. Same patient. Equino-varus, right. June 7, 1891, excision of astragalus. Good recovery. Good ankle-joint motion. Aug. 27, osteoclasia, and again Jan. 28, 1893.
201. Same operator. Patient, female, aged 6 months. Equino-varus, left. June 21, 1891, osteoclasia. Recovery good. Plaster-of-Paris supports.
202. Same operator. Same patient. Equino-varus, right. June 28, 1891, osteoclasia. Recovery good. Plaster-of-Paris supports. Died April 11, 1892, of measles.
203. Same operator. Patient, male, 2 years of age. Equino-varus, right; tenotomy and forcible rectification; failure. June 21, 1891, osteoclasia of leg above ankle. Recovery good. Nov. 10, 1892, walking about without assistance. Metal back splint.
204. Same operator. Same patient. Equino-varus, right; tenotomy and forcible rectification; failure. Aug. 11, 1891, excision of astragalus. Nov. 10, 1892, walking about without assistance. Metal back splint.
205. Same operator. Patient $2\frac{1}{2}$ months of age. Equino-varus, right, Aug. 29, 1891, osteoclasia of the leg. Position good. Sept. 14, taken home to-day suffering from an attack of diarrhoea. Plaster-of-Paris support.
206. Same operator. Same patient. Equino-varus, left. July, 1891, osteoclasia. Position good. Plaster-of-Paris support. Died Oct. 2, 1891.
207. Same operator. Patient, male, 12 years of age, equino-varus, left. July 17, 1891, osteoclasia. Position good. Recovery good. Plaster-of-Paris support.
208. Same operator. Patient, male 3 years of age. Equino-varus right. Oct. 29, excision of astragalus; May 23, 1891, osteoclasia. Wound healed. Recovery good. Braces.
209. Same operator. Patient, male, 3 weeks old. Equino-varus, right. Aug. 18, 1891, osteoclasia. Shape good. Recovery good.
210. Dr. Frank Hartley. Bost. Med. and Surg. Journ., 1890 (122) p. 270. Patient, male 21 years of age. Equino-varus, left, congenital; increased between 6 and 12 years; $\frac{2}{3}$ normal motion at ankle; neck of astragalus twisted very badly, and os calcis obliquely to tibia. June 5, 1889, excision of wedge at ankle from tibia and fibula, all of astragalus, part of cuboid, scaphoid, and os calcis. Healing normal. Allowed to walk in wards by middle of October; discharged Nov. 29th. Braces.
211. Same operator. Same patient. Equino-varus, right; same as left. Sept. 25, 1889, same operation as on left. Aug. 24th, union fairly good. Good recovery. Braces. Muscles regaining size and strength; crutches used only for long walks, and will be given up in one to two months, and retention apparatus can be then taken off.
212. Dr. T. W. Holmström, Surg. to Hosp. for Children in Copenhagen. Dr. P. Lorenzen, On the Treatment of the Higher Degrees of Congenital Varus. Kjøbenhavn, 1887. Patient 6 years of age. Marked deformity of right foot. Rigidity of, and excoriations of the foot. May 6, 1883, excision of astragalus and process of calcaneum and external malleolus. Foot slightly supinated and adducted. Three years later walked on outer border of foot. Scarpa's shoe.
213. Same operator and reference. Patient 5 years of age. Equino-varus, right. Rigidity. July 9, 1885, excision of astragalus, external malleolus, upper surface of calcaneum, and os naviculare. Good position; forefoot but slightly adducted. One year after, function better, adduction still exists; hyperostosis of tarsals. Shoes modelled for the foot. Ankle-joint motion slight.
214. Prof. Holmer. Dr. P. Lorenzen, Am Behandling af den Medfødt Krumpheds høier grades, Kjøbenhavn, 1887 (On the Treatment of the Higher Degrees of Congenital Talipes Varus). Patient 12 years of age. Equino-varus. Rigid deformity. May 10, 1878, cuneiform osteotomy; Esmarch's bandage. Correction almost complete. Gangrene set in and amputation was done.
215. Same operator and reference. Patient 5 years of age. Equino-varus, right. Rigidity. July 29, 1880, cuneiform osteotomy. Almost normal position. Six years later position almost as bad as before the operation. Modified Scarpa's shoe with rubber muscles. Very little ankle-joint motion.

216. Same operator and reference. Patient 11 years of age. Equino-varus, left. Feb. 17, 1880, cuneiform osteotomy. Heel could not be completely brought down, and incurvation of plantar not quite removed. Six years later slight incurvation of forefoot; heel not completely down. Modified Scarpa's shoe with rubber muscles. Very little ankle-joint motion.

217. Patient 12 years of age. Left equino-varus, marked. Rigidity. March 3, 1880, cuneiform osteotomy. Almost natural position obtained. Two years later foot well formed, function good. Modified Scarpa's shoe with rubber muscles. No considerable ankle-joint motion possible.

218. Same operator and reference. Patient 6 years of age. Left equino-varus marked. Rigidity. March 23, 1880, cuneiform osteotomy. Almost natural position obtained. Two years later foot nearly as bad as before. Scarpa's shoe.

219. Same operator and reference. Patient 17 years of age. Right equino-varus, marked. April 31, 1880, cuneiform osteotomy. Almost natural position obtained. Two years later position as good as just after operation. Ankle-joint motion to almost natural extent.

220. Same operator and reference. Patient 15 years of age. Equino-varus, left. Sept. 15, 1880, cuneiform osteotomy; Eschscholtz's bandage.

221. Same operator and reference. Same patient. Equino-varus, right. Nov. 9, 1880, excision of astragalus and cuneiform osteotomy. Died on Nov. 12, 1880, of carbolic acid poisoning.

222. Same operator and reference. Patient 4 years of age. Equino-varus, right. Rigidity. Nov. 23, 1880, cuneiform osteotomy. Almost natural position obtained. Two years later deformity considerable. Plaster-of-Paris bandage.

223. Same operator and reference. Same patient. Equino-varus, left. Rigidity. Jan. 15, 1893, cuneiform osteotomy. Almost natural position obtained. Two years later deformity considerable. Plaster-of-Paris bandage.

224. Same operator and reference. Patient 6 years of age. Equino-varus, left, marked. Rigidity. May 17, 1881, cuneiform osteotomy. Good position. Three years later amputation—mod. Syme. Scarpa's shoe.

225. Same operator and reference. Patient 13 years of age. Equino-varus left. Feb. 10, 1882, cuneiform osteotomy. Very good position. Three and a half years later function very good. Metal braces. Ankle-joint motion very good.

226. Same operator and reference. Patient 12 years of age. Equino-varus, right. Sept. 10, 1881, cuneiform osteotomy. Almost natural position.

227. Same operator and reference. Same patient. Equino-varus, left. March 8, 1882, excision of astragalus and prox. ant. calcaneum. Good position. Four years later she was walking on outer border of feet, the feet forming stiff bony masses. Metal braces.

228. Same operator and reference. Patient 3 years of age. Equino-varus, right. April, 18, 1882, cuneiform osteotomy. Good position.

229. Same operator and reference. Same patient. Equino-varus, left. March 13, 1884, cuneiform osteotomy. Good position. Natural position and good function of both feet. Scarpa's shoes. Very little ankle-joint motion.

230. Dr. Hueter. Patient, male. Equino-varus. Removal of astragalus and scaphoid. Good results.

231. Prof. A. Iversen. Dr. P. Lorenzen, *Om Behandling af den medfødte Klumpeføddes høiere grader*. Kjøbenhavn, 1887 (on the treatment of higher grades of congenital varus. Patient 5-6 years of age. Equino-varus, left. 1883, excision of astragalus; 1884, cuneiform osteotomy. Not very good position. Two years later very good position.

232. Same operator and reference. Patient 4 years of age. Equino-varus, right. 1884, excision of astragalus. Incomplete correction; some adduction and supination of forefoot. Two years later forefoot adducted and supinated, function poor. Shoes modelled to the deformity. Ankle-joint motion slight.

233. Dr. M. Julaquier. Bull. et Mém. de la Soc. de Chir. de Paris, 1890, xvi. pp. 67-68. Patient 5 years of age. Equino-varus, right, paralytic; equinus more marked. June 22d, excision of astragalus, cuboid, Anon's section of tendo Achillis and plantar fasciæ. Iodoform eczema very violent on July 14th, and lasting about one month. Healing complete after removal of small cartilage which caused a fistula.

234. Same operator and reference. Same patient. Equino-varus, left. June 22d, excision of astragalus. Completely healed by June 29th. Very good results. Braces. Left hospital Oct. 20th; normal articulation; no lateral motion; step firm and painless. Very satisfactory; the astragali were very peculiarly deformed; the neck hypertrophied, was raised up; body pyramidal and directed backward; transverse diameter one-third greater in front than posterior, the latter being lessened by pressure of malleoli. Bony wedge pointed out by M. Nélaton is seen slightly.

235. Same operator and reference. Patient 12 years of age. Talipes valgus, right, paralytic origin. July 18th, excision of scaphoid, section of peroneals behind the malleoli, and tenotomy of tendo Achillis. July 26th, union perfect; got up at beginning of September. Oct. 1st, left hospital with everything in good place. At end of November walked four kilometres without pain; everything in good condition. Braces.

236. Dr. C. N. D. Jones. N. Y. Med. Journ., 1891, pp. 53-404. Patient, female, 11 years of age. Equino-varus, double congenital. Nov. 1888, wedge of bone excised from cuboid in each foot. Nov. 29, 1890, resection of tarsus after Davies-Colley. Four weeks later feet in good position and wound healed. Water-glass and plaster splints till early in 1889. On Feb. 29, 1888, Phelps' open incision was made on both feet and forcibly rectified. She disappeared for several months, and feet relapsed. Inversion and fixation, then operated on Nov. 1888.

237. Dr. Kirmisson. Bull. et Mém. de la Soc. de Chir. de Paris, 1891, xvii. pp. 510-511. Patient 8 years of age. Equino-varus, right, congenital; foot at acute angle with axis of leg; astragalus

completely subluxated. Feb. 24, 1891, Phelps' operation (three tenotomies of tendo Achillis had been done previously). Perfect restoration of foot.

238. Dr. Daniel La Ferte. Harper Hospital Bulletin, 1891, ii. p. p. 39. Patient 5 years of age. Equino-varus, double congenital, severe. Nov. 9, 1889, excision of cuboid and section of tendo Achillis; Jan. 20, 1890, tendo Achillis again cut. Treatment continued several months; very good results. Tenotomy twice without success.

239. Dr. Le Bec. France Médicale, 1889. Patient 13 years of age. Equino-varus. March 22, 1888, excision of astragalus and scaphoid with section of tendo Achillis, tibialis anticus, and plantar fascia. Good union by first intention. Nine months later walks well, leg shorter, foot flat on the ground. Braces. Ankle-joint motion. Astragalus and scaphoid were ankylosed.

240. Same operator (not published). Patient 14 years of age. Equino-varus, right. Oct. 20, 1888, excision of astragalus and scaphoid. Two months later walks well, foot straight and flat. Braces. Ankle-joint motion limited.

241. Same operator Same patient. Equino-varus, left. Oct. 20, 1888, excision of astragalus and scaphoid. Suppuration for four weeks. Two months later walks well, foot straight and flat. Braces. Ankle-joint motion limited.

242. Same operator. Paris Thèse, 1889-90. H. Le Marc'hardam. Patient, female. Excision of astragalus and scaphoid, and section of tendo Achillis, tibialis anticus, and plantar fascia. Good result.

243. Dr. Le Dente. Paris Thèse (cites Bull. de la Soc. de Chirng.). Patient 30 years of age. Equino-varus severe. Excision of astragalus, cuboid, ant. ext. angle of os calcis, and post. int. angle of scaphoid. Very satisfactory result.

244. Same operator. Bull. et Mém. de la Soc. de Chir. de Paris, 1887, xiii. p. 728 (disc. on paper of Duret). Patient 7 years of age. Equino-varus. Excision of astragalus and cuboid and part of calcaneum. Some ankle-joint motion.

245. Dr. Lenger. Ann. de la Soc. Méd.-Chir. de Liège, 1890, xxix. pp. 165-66. Patient 11 years of age. Congenital varus, left, calcaneum elongated and its exterior surface curved inward; the trochlea of astragalus almost entirely outside the tibio-fibular sheath, scaphoid against the inner malleolus. Jan. 15, 1890, excision of astragalus and ant. 2 cm. of calcaneum. Healed within a month. Perforated zinc splint applied over dressings until healing was complete. Articulation free, especially after so extensive a bony resection. Dr. Lenger does not think that equino-varus can be arrested without extirpation of the astragalus.

246. Same operator and reference. Same patient. Congenital varus, right. Feb. 5, 1890, excision of astragalus and ant. 2 cm. of calcaneum. Healed within a month. Perforated zinc splint applied over dressings and healing was complete. Articulation free, especially after so extensive a bony resection.

247. Dr. Lucke. Patient, male, 15 years of age. Congenital varus, single. 1881, excision of astragalus. Good results.

248. Dr. Lund. Lancet, 1878, i. p. 349. Patient, male, 7 years of age. Equino-varus, left, severe. May 7, 1872, excision of astragalus. Wound healed by thirty-eighth day. Four months later walks comfortably with apparatus. Rectangular splint, elastic traction; on sixty-eighth day Barwell's elastic ties applied. Slight ankle-joint motion. Tenotomy at six months; apparatus failure.

249. Same operator. Paris Thèse, 1889-90, H. Le Marc'hardam (cites Chanod as above, see D (26) ante). Patient 29 years of age, Equino-varus, congenital. Removal of astragalus and section of aponeurosis plantaris and tib. ant. tendon. Result bad. Patient walked with a brace, but had pain in so doing.

250, 251. Same operator. Brit. Med. Journ., Oct., 1872. Patient, male, 7 years of age. Right and left equino-varus, congenital. Heels not on the ground. May 17th, excision of astragalus. Wound healed on thirty-eighth day. July 16th, Barwell's system applied; Sept. 30th, Sayre's shoes applied; rectangular splints just after operation. August 1st, considerable ankle-joint motion. Tenotomy at six months; under treatment four months and wore apparatus until thirteen months old. Wore shoes nearly one month, and walks without help.

252. Dr. C. W. MacGillivray. Trans. Clin. Soc. London, and Edinburgh Med. Journ., 1884-85. Patient, male, 6 years of age. Equino-varus, left. Tendons and fascia tense. Removal of cuboid, os calcis, and ext. cuneiform; second operation in same place removed truncated wedge. Healed rapidly; perfect position after second operation; boy walks with ease on sole of foot in six weeks after. Foot shortened and tendo Achillis on inner side, though quite mobile at meso-tarsal articulation. Suitable splint. Internal displacement decidedly improved; anterior part still points downward.

253. Dr. F. Margary (his obs. No. 2). Bull. et Mém. de la Soc. de Chir. de Paris, 1890, xvi. p. 89. Cites Margary, Sulla cura operativa del Pied Vara congenito inveterato, Milan, 1884. Patient 14 years of age. Equino-varus, double congenital, extreme. Curvature marked, contraction of plantar fascia, tibial muscles and tendo Achillis, motion at ankle-joint limited, marked atrophy of muscles of calf. Jan. 15, 1884, excision of astragalus, scaphoid, cuboid, section of tendo Achillis and tibialis anticus and plantar fascia, superficial and deep, and removal of part of the skin on upper surface of foot. Healing rapid, cicatrix, partly by first and partly by second intention. May 18, patient discharged in good condition; free motion in leg, and foot altogether corrected of deformity. Braces. The result both as to form and functioning power astonished surgeons who examined it.

254. Dr. Marzo Marzocchi. Archivio di Ortopedia, Milan, 1892, vol. ix. p. 119. Patient 13 years of age; Equino-varus, right. Muscles somewhat atrophied, but responded to voltin and electricity. Nov. 4, 1891, Phelps' method; later (date not given) excision of astragalus. Twentieth day, foot tends to deformity, and position of astragalus called for another operation; thirty days after second operation, perfect curve movements of flexion and extension; allowed walking very easily. Ankle-joint motion.

255. Same operator and reference. Same patient. Equino-varus left. Muscles somewhat atrophied, but responded to volition and electricity. Dec. 4, 1891, excision of astragalus and external malleolus and tenotomy of tendo Achillis. Excellent position, short foot, normal shape; no pain from motion at ankle; fortieth day, perfect cure. Ankle almost as free as natural joint.

256. Same operator and reference. Patient 14 years of age. Equino-varus, paralytic, extreme; no motion at astragalean articulation. Atrophy of muscles. Excision of astragalus and tenotomy of tendo Achillis. Fortieth day, with massage, considerable motion at talo-tarsal articulation; flexion and extension. Walking easy and rapid. Braces.

257. Dr. Mason. N. Y. Med. Record, 1887, n. 446. Patient, female, 20 years of age. Equino-varus, left, severe; plantar fascia divided previously. 1887, excision of astragalus with ext. malleolus. Hemorrhage in two weeks from foot; tibial amputation. Plaster dressing. Death in three weeks from blood poisoning.

258. Herr Mensell. Verhandl. d. Deutsch. Gesellsch. f. Chir., Berlin, 1878 (7) pp. 1-77. Patient, male, 12 years of age. Equino-varus, double, congenital, severe. April, 1877, excision of wedge of tarsus; other foot operated upon in the fall. Muscles of leg grew stronger; good recovery. Slight ankle-joint motion. Tenotomy had been done in infancy, and good result secured, but neglect allowed a relapse, and boy was unable to walk.

259. Monnier. Journ. de Médecin, Paris, 1892, 2 s. p. 337. Patient, boy, 5 years of age. Equino-varus. Ablation astragalus. Varus corrected; equinus remained. Entire correction. Braces for eight months. Complete flexion and extension.

260. Same operator. Ibid., 1893, 2 s. p. 177. Patient, boy, 14½ years of age. Equino-varus. Ablation astragalus. Correction. Absolute ankylosis. Braces.

261. Dr. L. Monnier, Surg. to St. Joseph's Hospital, Paris. Journ. de Méd. de Paris, vol. iv. 2 s. n. 28, pp. 337-339. Patient 3 years of age. Equino-varus left, congenital. Atrophy of muscles of leg. June 10, 1891, excision of astragalus and small part of scaphoid, with tenotomy of tendo Achillis. Eighteenth day, good position; foot in an apparatus; July 25th, slight pressure on the sole of the foot obtains perfect position of foot. March, 1892, could walk all day without fatigue; foot well placed on the ground; good functional ankle-joint. Braces.

262. Same operator and reference. Same patient. Equino-varus, right, congenital. Atrophy of muscles of leg. Tenotomy sufficed. Wound healed by eighteenth day; apparatus kept on all the time; complete restoration hard to obtain. March, 1892, could walk all day without fatigue; foot well placed on the ground; good functional ankle-joint. Braces. Two engravings showing feet before and after operation.

263. Dr. J. E. Moore. Med. Record, March 17, 1891. Patient 28 years of age. Equino-varus. Ulcer on side of foot. For operation see reference. Walks easily with foot in good position. Two years later foot in excellent position. Ankle-joint motion limited.

264, 265. Same operator. Not published. Patient 9 years of age. Equino-varus, right and left. Phelps' operation, and wedge-shaped piece from outer side of tarsus. Good position; uses crutches. Six months later patient "first-rate." Ankle-joint motion limited. Dr. Moore has rarely found bone operations necessary, but thinks results would have been better, in some cases, if he had operated, and will do more of them in the future.

266. Same operator. Patient 6 years of age. Equino-varus, right. Phelps' operation and wedge-shaped piece from outer side of foot. Normal position; patient could walk. One year later foot perfect. Good ankle-joint motion.

267. Same operator. Same patient. Equino-valgus, left. Removal of wedge-shaped piece from inside of foot. Normal position; patient could walk. Supported arch of sole by filling up sole of shoe. Ankle-joint motion good.

268. T. S. K. Morton. Med. News, Phila., 1889 (54), 542. Patient, female, 19 years of age. Equino-varus, extreme. July 1888, excision of wedge of tarsus. Primary union; foot in excellent position; dressed in three weeks. Oct., 1888, walks in ordinary shoes without limp or discomfort. Right-angle tin splint.

269. Dr. T. G. Morton. Same reference. Patient 18 years of age. Equino-varus, right and left. Legs poorly developed. Excision of cuboid, external and middle cuneiform, and part of scaphoid. Primary union, perfect result, useful and presentable feet. Tenotomy failed to correct deformity.

270. Same operator and reference. Patient, female, 5 years of age. Equino-varus, left. Excision of wedge of tarsus; division of tendo Achillis, tibial and long flexor of big toe. Perfect result. Now able to wear an ordinary shoe. One of five children, all of whom had club-foot. Parents robust and healthy, and no deformity in any part of family.

271. Same operator and reference. Patient, female, 12 years of age. Equino-varus, right, severe. Excision of wedge, and tenotomy. Three weeks later doing well. Dr. Morton thinks treatment of muscles after operation of great importance.

272. Same operator and reference. Patient, male, 14 years of age. Congenital equino-varus, left; outward displacement and rotation of astragalus, fibular articular process presenting subcutan. in central plane of leg. Right foot normal, 3¼ inches longer than left. Considerable atrophy. July 16, 1889, excision of astragalus; division of tendo Achillis. Aug. 11th, foot in excellent condition and position; wound healed except superficial ulcer; Aug. 13th, wound entirely cicatrized; Aug. 28th, able to walk. Right-angle tin splint; Aug. 28th, braces applied. April, 1890, good ankle motion. Tenotomy at 9 years of age, no success; also wore braces several years. Aug. 11th, twenty-six days after operation, redressed for first time. Foot presents no tenderness. Excellent position of foot and limb; position normal.

273. Same operator and reference. Patient, male, 3 years of age. Double congenital equino-varus; left foot in worse condition, the astragalus being rotated through nearly half circle with its tibial articular surface subcutaneously. Aug. 22, 1889, excision of astragalus. Sept. 3, dressed; slight,

superficial wound; walks well, good motion, position of foot at right angle, May, 1890, left foot in excellent position. Right-angle tin splint with opening opposite heel. Unsuccessful tenotomy in infancy in both feet. Left foot, catgut drain and permanent dressing; no need to disturb dressing for several weeks.

274. Same operator and reference. Patient, male, 3 years old. Right foot greatly deformed now after tenotomy in infancy. Aug. 22d, excision of astragalus; open incision with extensive division of tendons. Sept. 3d, dressed, wound closed. Right foot, some disposition to recurrence of varus. Excision of astragalus will soon be done.

275. Same operator and reference. Patient, male, $2\frac{1}{2}$ years of age. Congenital equino-varus, left; astragalus markedly rotated, and its tibial articular surface subcutaneous. Sept. 27th, operation as above; excision of astragalus. Nov. 3d, dressed. April, 1890, position excellent; walks without lameness. Perfect cure.

276. Same operator and reference. Patient, female, 5 months. Double congenital equino-varus; astragalus of each foot was displaced forward and rotated; deformity very marked and tarsus rigid. Oct., 1889, excision of astragalus from each foot. Dressed twice; three weeks after operation was able to stand; ten weeks after walked without difficulty. April, 1890, position of feet good; walks with freedom. Formerly manipulation and stretching, but no good. Feb., 1889, under ether, feet were thoroughly stretched, but neither foot could be brought to right angle with the leg; tin splint applied, and removed each day. Massage and traction used. April 10th, again stretching, under ether, with apparatus, all to no benefit.

277. Same operator and reference. Patient 2 months old. Double congenital equino-varus marked; both feet the same. Flexion of feet greatly hindered by displaced astragalus. Oct. 24, 1889, excision of astragalus from each foot. Perfect rectification of position and motion. March, 1890, result in every respect satisfactory; flexion, extension, and position excellent. Oct. 20, 1887, manipulation, massage, apparatus, tenotomy. March, 1888, condition the same; marked equinus; tenotomy of Achillis and stretching; apparatus continued; Oct. 24, 1889, deformity increased, astragaloid equinus very marked.

278. Dr. T. G. Morton. Med. News, Phila., 1890 (57), p. 25. Patient, male, 16 years of age. Severe congenital talipes equino-varus, left. Marked atrophy of entire limb; ankle very rigid. April 19, 1890, excision of astragalus, division of tendo Achillis. Usual dressing; foot could be placed in normal position without tension. For many years had been without apparatus; manipulation, stretching, no result. Measurements: right thigh $15\frac{1}{2}$, calf $11\frac{1}{2}$, left thigh 10, calf $8\frac{1}{2}$.

279. Same operator and reference. Patient, male, 4 years of age. Congenital talipes varus, right, marked; unable to flex foot; astragalus displaced; weak ankles, and slight valgus of left foot. Incurvation of knee; tendo Achillis rigid. Feb. 22, 1890, excision of astragalus, division of tendo Achillis. Dressed on 5th and 23d day when union was firm; perfect position and good motion. April, 1890, result most satisfactory as to position and motion. Good ankle motion. No family history of deformity. Unsuccessful treatment three years by massage and apparatus. In Feb., 1886, when only three months old, above treatment.

280. Same operator and reference. Patient, male, 15 months old. Congenital double equino-varus; right varus and equinus marked. Impossible to flex either foot to right angle; astragalus displaced and subcutaneous. March 22, 1890, excision of astragalus, division of tendo Achillis. Feet brought to perfect position. Present condition most satisfactory; has been able to walk for several weeks. Right-angle tin splint. Daily stretching.

281. Same operator and reference. Same patient. Left more severe equino-varus, otherwise condition same as in right foot.

282. Same operator and reference. Patient, male, 5 years of age. Double congenital equino-varus, marked. March 10, 1889, tarsectomy and open incision, division of tendo Achillis, ant. and post. tibials and plantar fascia. March 22, excision of astragalus in each foot, the bones were found quite ant. to tibia and rotated. May 1st, discharged in apparently fair condition. After the excision the feet could without difficulty be placed at right angles with leg. April 27th, position of feet perfect. May 10th, walks without apparatus and with ordinary shoes; limbs straight; feet turned out. Right-angle tin splint. Ankle motion. May 1st, directed to wear braces and continue stretching. March 20, 1890, readmitted with aggravated equino-varus; tarsus rigid; astragalus cause of deformity; very limited amount of joint flexion; unable to stand alone.

283, 284. Same operator and reference. Patient, female, 7 years of age. Double congenital equino-varus; deformity excessive; walks on cuboid bones; great contraction of all soft parts, including sole and inner side. Thighs, legs, and feet markedly atrophied and spindle shaped; thighs and leg bones small, feet more solid and deformed than ever known at such an age; ankle-joints apparently ankylosed. April 26th, right foot tarsus were so dense and distorted and so firmly wedged that with great difficulty could the articula be identified: removal of astragalus, cuboid, ext. cuneiform, part of scaphoid necessary to bring foot to right angle with leg, also division of tendo Achillis, plantar fascia, flex. tendons of toes. May 12th, doing well; has not been dressed since operation; feet in excellent position. Right-angle tin splint. Tenotomy operation in infancy unsuccessful; general health good; no family history of deformity; weight 46 lbs.; no treatment in past three years. The wasting and contraction of soft parts on inner side of sole did not impede rectification. In all cases, limbs were kept elevated for several days. Primary union—primary dressing not disturbed before end of third, generally in fourth week. Shortly after first month, the child should be encouraged to walk, when the tin splint must make way for the ordinary talipes walking shoes with high heels.

285. Same operator and reference. Patient, male, 16 years of age. Double congenital equino-varus; walks on dorsum of feet. Legs poorly developed. Oct. 31st, excision of cuboid from right foot. Dec. 2d, excision of left cuboid by Thos. S. K. M.; foot brought in position. Good position; primary union; result perfect. For some months wore braces, then abandoned them, since which time he wears ordinary shoes; feet are perfect. Had never been operated on. Oct. 9th, tenotomy of all resisting structures in left foot (best foot), put it in good position as possible and placed in right-angle tin splint. Result not favorable.

286. Same operator. *Now England Med. Monthly*, Bridgeport, 1887, vii. Equino-varus, double. Excision of cuboid in each foot. Cured.

287. Same operator and reference. Patient 17 years of age. Equino-varus marked. Rigidity. Excision of cuboid. Union by first intention. Well padded right-angle splint. Walked at end of fourth week in ordinary club-foot shoe. Condition perfect. Can use common laced shoes without steel supports easily.

288. Same operator and reference. Same patient. Excision of astragalus. Entire correction 16 months later. Ankle motion.

289. Same operator. *Med. News*, Phila., 1889 (54), 542. Patient 4 years of age. Equino-varus, left. Feb 13th, excision of wedge. Dressed in three weeks. Solid union and excellent position.

290. Same operator and reference. Same patient. Equino-varus, right. March 21st, excision of wedge, also tenotomy and open incision on inner aspect of foot. Dressed at end of fourth week. Solid union and excellent position.

291. Same operator and reference. Patient 4 years of age. Equino-varus, right. Cuneiform osteotomy and tenotomy. Dressed in three weeks.

292. Same operator and reference. Same patient. Equino-varus, left. Cuneiform osteotomy and open incision on inner side of foot. Dressed in three weeks. Both feet perfectly restored in shape and utility.

293. Same operator. Patient 4 years of age. Equino-varus. June 14, 1890, excision of astragalus. Good position and motion. Braces. Ankle motion, both feet.

294. Same operator. Patient 17 months old. Equino-varus. Oct. 2, 1890, excision of astragalus. Good position and motion. Braces. Ankle motion, both feet.

295. Same operator. Patient 17 years of age. Equino-varus. Oct 16, 1890, excision of astragalus. Good position and motion. Braces. Ankle motion, both feet.

296. Same operator. Patient 4 years of age. Equino-varus, right. Nov. 16, 1890, excision of astragalus. Good position and motion. Braces. Ankle motion.

297. Same operator. Patient 6 years of age. Equino-varus, left. April 23, 1892, excision of astragalus. Good position and motion. Braces. Ankle motion.

298. Same operator. Patient 7 years of age. Equino-varus, right. March 14, 1891, excision of astragalus. Good position and motion. Braces. Ankle motion.

299. Same operator. Patient 19 years of age. Equino-varus, left. Oct. 29, 1891, excision of astragalus. Good position and motion. Braces. Ankle motion.

300, 301. Same operator. Patient 11 years of age. Equino-varus, right and left. Jan. 28, 1892, excision of astragalus. Good position and motion. Braces. Ankle motion. Dr. Morton thinks that if, after removal of astragalus, good position does not obtain, it is well to take out cuboid and external cuneiform in whole or in part, at all events get foot straight.

302. Same operator. Patient 14 years of age. Equino-varus, right. May 11, 1892, excision of astragalus. Good position and motion. Braces. Ankle motion.

303, 304. Same operator. Patient 20 months old. Equino-varus, right and left. Dec. 1, 1892, excision of astragalus. Good position and motion. Braces. Ankle motion.

305. Dr. Herman Mynter. *Buffalo Med. and Surg. Jour.*, 1889-90, (29), p. 417. Patient, male, 25 years of age. Equino-varus. Ulcerated bunion. Oct. 12, 1889, excision of cuboid, 2d and 3d cuneiform, and 5th, 4th, and 3d metatarsals, tendons, and plantar fascias according to Phelps. Good position; all healed in nine weeks. Walks without pain. Plaster-of-Paris dressing. If patient walked one week formerly, would have to stay in bed seven months to heal the ulcer. Discharged Dec. 18th, cured.

306. Dr. Nélaton. *Bull. et Mém. de la Soc. de Chir. de Paris*, 1890, xvi, p. 61. Patient 8 years of age. Talipes equino-varus, right; foot makes angle of 40° with leg, and extreme of calcaneum rests on ground, axis of calcaneum nearly vertical and parallel to axis of leg; head and trochlea of astragalus form larger protuberance in front. Atrophy of leg muscles is considerable. July 12th, excision of head of astragalus, part of great apophysis of calcaneum, and tenotomy of tendo Achillis, and incision of Phelps on inner side of foot, well within a month.

307. Same operator and reference. Same patient. Equino-varus, left, same as above with prominence of icteroid projection of ant. lateral region of trochlea of astragalus sprung from its socket. Atrophy of leg muscles is considerable. July 29th, Phelps' incision; resection of head of astragalus and ant. part of calcaneum apophysis, with tenotomy of tendo Achillis. A month later excised articular surface of astragalus and trochlea (outer edge), and again cut tendo Achillis. Equinus persisted until after second operation (see below).

308. Same operator. *Ibid.*, p. 61-71. Same patient (2 years later). Equino-varus, left; back part of foot nearly vertical, and front part curved on it at right angles. Dec. 26th, excision of ext. surface, head, and neck, and trochlea of astragalus, and 1 cm. of large apophysis of calcaneum, tenotomy of tendo Achillis, and setting in place the displaced cuboid. Successful.

309. Dr. Ollier. *Paris Thèse*, 1889-90 (cites H. le Marc'hardam, *Ollier Lyon Méd.*, Nov. 27, 1880). Patient 9 years of age. Equino-varus, double. Excision of astragalus, cuboid, and anterior part of calcaneum. Incomplete; slight varus remains. Massage previously, and section of tendo Achillis and plantar fascias.

310. Dr. G. Dallo Ore. *Rivista Veneta di Scienza Medica*, Venice, 1887, vol. vi, p. 298. Patient 20 years of age. Equino-varus, left, marked. Aug. 12, 1887, excision of astragalus and subcutaneous section of tendo Achillis. Temporary brace removed after forty days, foot in excellent position, sole flat on ground, legs equal in length. Sufficiently free ankle motion. When a child, patient sustained a dislocation of foot which was not reduced.

311. Dr. Paci. Paris Thésis, 1889-90, H. le Marc'hardan (cites Martin, same place as 2d ser., June 7, 1887). Patient 9 years of age. Equino-varus, right, marked; foot much drawn up, and makes almost a right angle with leg, plantar fascia strongly drawn. Considerable atrophy of limb. Sept. 15, 1884, excision of astragalus and section of plantar fascia. March 23, 1885, walks well, but there is a tendency to drawing up the forefoot. Brace corrects this. May 15th walks good.

312. Dr. John H. Packard. Patient 22 years of age. Equino-varus, right. Atrophy of muscles. Dec. 24, 1890, excision of astragalus and division of tendo Achillis, tendons of ant. and post. tibials, plantar fascia, and tendons of flexors of toes. Entire rectification; foot slightly pushed forward. No recurrence; patient walks well and firmly eighteen months later. About six months later a re-inforced boot.

313. Dr. Francesea Paroma. *Annal. Universali di Med. e Chir.*, Milan, 1887, vol. cclxxix. p. 121. Patient age not given. Equino-varus, right. May 27, 1886, excision of astragalus, resection of ext. malleolus (subperiosteal), tenotomy of tendo Achillis and plantar fascia (Margary's method). At end of three months patient walking about with foot inclosed in a half boot, braced. Foot in good position. "The tendo artienlations have movements sufficiently free."

314, 315. Same operator. *Ibid.*, p. 123 et seq. Patient 10 years of age. Equino-varus, right and left; great toes of the two feet touched. Sept. 2, 1886, cuneiform osteotomy of mid-tarsal bones, excision of 1 cm. of malleolus with a wedge formed of bones of os calcis, cuboid, astragalus, and scaphoid (wedge being 3 cm. long and base 2 cm.), and tenotomy of tendo Achillis, tibialis anticus, and plantar fascia. By the end of October wounds were cicatrized, and a plaster bandage was then applied. Nov. 8, 1886, foot in good position and deformity well corrected; sufficient mobility. Ankle motion.

316. Dr. Roswell Park. Patient 10 months old. Equino-varus, left, marked. Jan. 22, 1890, cuneiform tarsectomy. Results good. Not seen since. Braces.

317. Same operator. Patient 3 years of age. Equino-varus, right. March 3, 1890, cuneiform tarsectomy. Good results two years and a half later. Braces. Ankle motion.

318, 319. Same operator. Patient 7 months old. Equino-varus, right and left. Sept. 5, 1891, excision of astragalus, right; and cuneiform tarsectomy, left. Good results. Not seen since. Braces.

320. Same operator. Patient 2½ years of age. Equino-varus, right. Oct 10, 1891, astragalectomy. Good results. Not seen since. Braces.

321, 322. Same operator. Patient 4 months old. Equino-varus, right and left. Nov. 26, 1891, astragalectomy. Good results. Not seen since. Braces.

323, 324. Same operator. Patient 7 years of age. Varus, right and left. Nov. 19, 1892, astragalectomy, right; and excision of astragalus, piece of mid-tarsal, and os calcis, left. Good results. Not seen since. Braces.

325, 326. Same operator. Patient 1½ years of age. Equino-varus, right and left. Feb. 16, 1893, astragalectomy. Good results. Not seen since. Braces.

327. Dr. Patterson. *Lond. Lancet*, 1880, i. 47. Equino-varus, congenital, double. Removal of cuboid and astragalus. Successful.

328. Dr. A. M. Phelps. *Med. Record*, New York, 1890, p. 593. Patient 13 years of age. Talipes equino-varus. Linear osteotomy. Wound healed in four weeks. Plaster-of-Paris shoe. Tenotomy previously done. Perfect result after four months.

329. Same operator and reference. Patient 8 years of age. Double talipes equino-varus. Linear osteotomy. Wound healed in four weeks. Plaster-of-Paris shoe. Perfect result means straight and useful feet either toeing straight ahead or with normal function fairly preserved.

330. Same operator and reference. Patient 15 years of age. Double talipes equino-varus. Linear osteotomy and cuneiform resection. Wound healed in four weeks. Plaster-of-Paris shoe. Perfect result.

331. Same operator and reference. Patient 17 years of age. Double talipes equino-varus. Linear osteotomy and cuneiform resection. Wound healed in five weeks. Plaster-of-Paris shoe. Perfect result.

332. Same operator and reference. Patient 10 years of age. Double talipes equino-varus. Linear osteotomy. Wound healed in four weeks. Plaster-of-Paris shoe. Perfect result.

333. Same operator and reference. Patient 9 years of age. Double talipes equino-varus. Linear osteotomy. Healed in five weeks. Plaster-of-Paris shoe. Perfect result.

334. Same operator and reference. Patient 22 years of age. Single talipes equino-varus. Linear and cuneiform osteotomy. Healed in five weeks. Plaster-of-Paris shoe. Good result means in-toeing of foot with congenital defect in ankle-joint, tibia or muscle, but useful feet—walking on plantar surface.

335. Same operator and reference. Patient 31 years of age. Single talipes equino-varus. Linear osteotomy and removal of cuboid and scaphoid. Healed in five weeks. Plaster-of-Paris shoe. Perfect result.

336, 337. Same operator and reference. Patient 16 years of age. Double talipes equino-varus. Linear osteotomy, cuneiform resection, right; linear osteotomy, left. Healed in six weeks. Plaster-of-Paris shoe. Good result.

338. Same operator and reference. Patient 11 years of age. Single talipes equino-varus. Linear osteotomy. Healed in five weeks. Plaster-of-Paris shoe. Good result.

339. Same operator and reference. Patient 21 years of age. Single talipes equino-varus. Linear osteotomy and removal of cuboid and scaphoid. Healed in seven weeks. Plaster-of-Paris shoe. Good result. Slough from tight dressing.

340. Same operator and reference. Patient 8 years of age. Double talipes equino-varus. Linear osteotomy. Healed in five weeks. Plaster-of-Paris shoe. Perfect result.

341. Same operator and reference. Patient 4 years of age. Single talipes equino-varus. Linear osteotomy. Healed in four weeks. Plaster-of-Paris shoe. Perfect result.

342. Same operator and reference. Patient 17 years of age. Single talipes equino-varus. Linear osteotomy and cuneiform resection. Healed in six weeks. Plaster-of-Paris shoe. Good result.

343. Same operator and reference. Patient 5 years of age. Double talipes equino-varus. Linear osteotomy. Healed in five weeks. Plaster-of-Paris shoe. Good result.

344. Same operator and reference. Patient 12 years of age. Double talipes equino-varus. Linear osteotomy. Healed in five weeks. Plaster-of-Paris shoe. Perfect result.

345. Same operator and reference. Patient 16 years of age. Single talipes equino-varus. Linear osteotomy. Healed in six weeks. Plaster-of-Paris shoe. Perfect result.

Eighteen osteotomies in all. In no case a sensitive scar, flat-foot, or paralysis. No considerable atrophy of muscles in limb. Motion of toes preserved in nearly all cases. In those with loss of motion, locomotion seemed to be as perfect.

346. Dr. M. Piechaud. *Journ. de Méd. de Bordeaux*, Dec. 22, 1889, vol. ix. No. 21, p. 213. Patient an infant. Equino-varus marked. Boeckel's operation: excision of astragalus and resection of external malleolus, part of scaphoid, os calcis, cuboid, and section of tendo Achillis, tibialis anticus, and lesser adductor of big toe. Very satisfactory; massage. Dec., 1889, cured. Plaster-of-Paris.

347. Same operator. *Bull. et Mém. de la Soc. de Chir. de Paris*, 1890, xvi. pp. 89, 98. Patient 2 years of age. Equino-varus, double. Ablation of cuboid. Feet well straightened. Satisfactory.

348. Same operator and reference. Patient 12 years of age. Equino-varus. Excision of astragalus, calcaneum, and scaphoid, and parts of cuboid and external malleolus. Some suppuration. Nine months later walks walks well, limps slightly.

349. Dr. Picque. *Ibid.*, 1891. xvii. p. 92. Patient, age not given. Partial luxation of astragalus, following infantile paralysis. Extirpation of astragalus.

350, 351. Dr. Pilcher. M. E. Hospital, N. Y., 1890. Patient 22 years of age. Equino-varus, right and left congenital, extreme. Excision of astragalus and cuneiform osteotomy of os calcis, of scaphoid and cuboid, section of contracted structures. Uncomplicated recovery. Very good six months later, feet strong and useful, and cure permanent. Plaster-of-Paris.

352. Same operator and reference. Patient, female, 14 years of age. Equino-varus, left; paralytic; braces for long time. Excision of astragalus, resection of cuboid and os calcis, and section of plantar fascia. Very good, but leg somewhat shortened. Plaster-of-Paris and steel braces.

353. Dr. Poissot. *Bull. et Mém. de la Soc. de Paris*, 1880 (6), 455. Patient, female, 12 years of age. Equino-varus, left, acquired, severe. 1878, excision of cuboid, and tenotomy. Walks on sole; requires apparatus; foot straight. Metal splint. Tenotomy at two years unsuccessful.

354. Dr. C. T. Poore. *N. Y. Med. Journ.*, 1886 (43), p. 555. Patient 10 years of age. Equino-varus, left, congenital. Rigidity. Cuneiform osteotomy. No pain; walks with slight limp. Ankle motion increasing.

355. Same operator. *Annals of Surgery*, St. Louis, 1887, v. pp. 207-210. Patient 10 years of age. Equino-varus, right, congenital. Rigidity extreme. Jan. 14, 1886, wedge removed. Wound closed in one month; use of foot disallowed for eight weeks. When discharged could walk with foot flat on floor. Plaster-of-Paris. Slight ankle motion. Attack of scarlet fever during treatment. Division of tendo Achillis and forcible correction with Bradford's instrument twice before had failed to correct.

356, 357. Same operator and reference. Patient, male, 8 years of age. Equino-varus, left, congenital, os calcis normal, front foot turned at right angles to it. Right, the same. Always slight paresis of lower extremities. Dec. 25, 1885, cuneiform tarsectomy, left. Feb. 6, 1886, same operation, right. Wounds closed in one week. Walking easy, sole flat on ground, right. Tendency of whole foot to point inward. Plaster-of-Paris. Tendons had been cut; mechanical treatment used for three years; three attempts to correct with Bradford's instrument, but no success.

358. Same operator and reference. Patient 14 years of age. Equino-varus, left, congenital; foot had been corrected but relapsed. Feb. 26, 1886, V-shaped piece from os calcis and neck of astragalus. High fever after one week; foot swollen; wound blue and sloughy. Plaster-of-Paris. Died on twelfth day of septicæmia. Under treatment several years, and had worn braces all this time.

359. Dr. Paulo Postempski. *Bulletin della Reale Academia Med. di Roma*, 13th year, 1887, p. 289. Patient, boy about 17 or 18 years of age. Equino-varus, left, congenital; astragalus very prominent in lateral external region of foot, and scaphoid on inner surface. Atrophy of leg. 1886, excision of astragalus; Lund's operation as done by Margary. Wound healed on 35th day, and deformity corrected. March 27, 1887, after 35 days patient gradually abandoned all support and walked perfectly well save a slight limp due to atrophy of leg. Sufficiently ample motion in new joint.

360. Dr. David Prince. *St. Louis Med. and Surg. Journ.*, 1888, vol. liv. Age and deformity not given. Tarsectomy. Plaster-of-Paris.

361. Dr. R. M. Pugh. *Liverpool Med.-Chir. Journ.*, 1886. Patient, female, 11 years of age. Position of foot not stated. Nov. 7, 1885, removal of astragalus, cuboid, and scaphoid. Jan. 28th, walks with ease without apparatus; foot shortened. Talipes split. Subsequently divided some contracted plantar bands.

362. Same operator. *Ibid.*, 1888, p. 355. Patient, female, 9 years of age. Equino-varus, right, extreme. Considerable atrophy; small foot. June, 1881, resection of cuboid. Healed in a little over a fortnight. Relapse, and in March, 1882, excision of head of astragalus, with complete recovery. Wore Brinton's shoe two months after first operation. Tenotomy had been done several times.

363, 364. Dr. M. Qulenu (cites from Thesis of Marth, 1888). *Paris Thesis*, 1889-90, II. le Marc'hadam. Patient 15 years of age. Equino-varus, right and left, congenital; astragalus opposes all reductive measures. Atrophy of muscles of leg and thigh; genu valgum. Jan. 5, 1885, excision of astragalus, right; March 1, 1885, excision of left astragalus. March 1st, equinus healed; some varus still exists. Good result, left. June 30th, went out cured, walked without apparatus, but walk irregular from genu valgum.

365, 366. Dr. Artur Raffia. *Archivio di Ortopedia*, Milan, 1886, vol. iii. pp. 445-47. Patient 13 years of age. Equino-varus, double congenital, excessive; the great toes of the feet approximated; in all the articulations the movements were limited. Atrophy of the muscles and "an enormous deposit of adipose connected especially at the lower third of the supra-malleolar region;" the feet were relatively small. Jan. 7, 1886, right foot, enucleation of the astragalus and the scaphoid, resection of the external malleolus, plantar aponeurotomy, and Achillo-tenotomy of both feet (subcut.). Jan. 21, 1886, same operation on left foot. Fiftieth day, commenced to walk at first with the help of a crutch, later with a stick. April 1, 1886, discharged. Braces.

367. Same operator and reference. Patient 13 years of age. Equino-varus, congenital, left, grave; the patient walked supported solely on the head of the further metatarsals and upon the toes. April 15, 1886 (left foot), extirpation of the astragalus, resection of the external malleolus, Achillo-tenotomy (subcut.). A month later cured; normal position of the foot; movements of flexion and extension possible. Braces. Ankle motion.

368, 369. Same operator and reference. Patient 2 years of age. Equino-varus, double congenital. July 1, 1886, tenotomy of the tendo Achillis and cuneiform tarsotomy of right foot. July 1, 1886, identical operation on left foot. Aug. 1st, applied usual half boot; patient supports himself on his feet, and with help walked a few steps. Discharged (date not stated). Braces.

370, 371. Dr. Rawdon. *Liverpool Med.-Chir. Journ.*, 1883, p. 355. Patient, male, 8 years of age. Equino-varus, double congenital, extreme; never walked; very high arch of foot. Cuneiform osteotomy of head of astragalus ad cuboid. Recovery. Tenotomy done two years ago, and Scarpa's shoes with elastic traction fairly overcame deformity, but astragalus prevented thorough reduction.

372. Dr. Reclus. *Bull. et Mém. de la Soc. de Chir. de Paris*, 1887, p. 704 (disc. on paper of Duret). Patient a child. Equino-varus. Excision of astragalus with section of tendo Achillis and plantar fascia. A certain concavity at head of int. edge of foot remains.

373. Dr. J. C. Renton. *Glasgow Med. Journ.*, 1889 (5) s. 31, p. 338. Patient 11 years of age. Equino-varus, left, acquired. Aug. 25th, excision of wedge of tarsus. Eight months later good result. All structures in sole and tendons had been divided in infancy with temporarily good results.

374, 375. Same operator and reference. Patient 7 years of age. Double equino-varus, left, relapsed, severe. Nov. 24, 1885, removal of astragalus, Phelps' operation. Two years later, plays football.

376. Same operator and reference. Patient 2½ years of age. Equino-varus, double, severe. Excision of astragalus ten days between operations. Eighteen months later tendency to relapse. Rectangular tin splint. Good ankle motion. Several operations had been done, but no success.

377. Prof. Richet. *Bull. Méd., Paris*, 1888, ii. 891. Patient 5 years of age. Equino-varus, double; feet rest on outer apophysis of calcaneum. June 25, 1888, excision of one astragalus and resection of anterior part of calcaneum, tenotomy of tendo Achillis. July 6th, good position, but suppuration of wound, and rear incisions for tenotomy. In operating on other foot, he will do tenotomy eight days before ablation of astragalus.

378. Dr. B. M. Ricketts. *Journ. Amer. Med. Assoc.*, Chicago, 1892 (19), 219. Patient, male, 14 years of age. Equino-varus, right, congenital, severe; weight of body on astragalus, foot turned straight back. Sept. 2, 1891, excision of astragalus, section of tendo Achillis and plantar fascias. On crutches at end of four weeks. Left hospital at end of tenth week cured; wears shoes, no crutches. Position maintained by straps passed under foot close to toes, and made fast to hooks, woven in plaster, extending from middle of thigh to below knee. Left foot cured by manipulations; apparatus could not be worn.

379. Dr. Reid. Patient 4 years of age. Equino-varus, right, congenital; section of tendo Achillis was a failure. Oct., 1887, excision of astragalus and 1 cm. of fibula; five months later, section of tendo Achillis and plantar fascia. June 28, 1888, some varus remains.

380. Same operator. *Paris Thesis*, 1888-90, H. le Marc'hadam. Patient 14 years of age. Equino-varus, congenital. Jan., 1879, excision of astragalus and part of malleolus, with section of plantar fascia. In February severe pains in foot prevented walking, and kept patient in bed several weeks. Walks with a shoe and lateral splints.

381. Same operator. *Deutsche Zeitschr. f. Chir.*, 1880 (13), p. 114. Patient, female 43 years of age. Equino-varus, left, acquired, severe. Rheumatic ankylosis. 1865, excision of astragalus and malleolus. Good results in four weeks. Good ankle motion. Fixation.

382. Same operator and reference. Patient, male, 44 years of age. Equino-varus, severe, acquired. 1875, excision of astragalus; straightening produced fracture. Treated for three months. Excellent result. Plaster.

383, 384. Dr. Sands (reported by Dr. A. K. Briddon). *N. Y. Med. Journ.*, 1891 (53), p. 312. Patient, female, 4 years of age. Equino-varus, double. Sept. 20, 1890, wedge from tarsus. Oct. 25, 1890, cuneiform osteotomy, left. Allowed to walk in glass splints in 48 hours. Jan. 14th, splints removed, position perfect. Plaster-of-Paris. Glass splints over plaster in 48 hours. Previous tenotomy had partially corrected equinus.

385. Same operator. *Ibid.*, 1888 (47), p. 158. Patient 12 years of age. Equino-varus, congenital, exaggerated. Nov. 5, 1887, excision of cuboid, ext. and mid. and int. cuneiforms and parts of scaphoid and os calcis. Wound healed by Dec. 17th; slight plantar flexion remained. Splint removed Jan. 5th. Results noticed until Jan. 11, 1888. Plaster-of-Paris. Considerable ankle motion. Bony union not quite firm; Jan. 11th, slight equinus remained, which would have been overcome if astragalus had been removed.

386. Same operator and reference. Patient 6 years of age. Cuneiform tarsotomy and excision of astragalus. Union by first intention. Plaster-of-Paris. Good ankle-joint motion. Leg somewhat shortened.

387. Dr. Schede. Patient an infant. Equino-varus, congenital. Removal of parts of cuboid, astragalus, and scaphoid, and section of tendo Achillis. Good result.

388. Dr. Schwartz. *Bull. et Mém. de la Soc. de Chir. de Paris*, 1892, xviii. pp. 94-96. Patient 22 years of age. Equino-varus, paralytic; absence of response in muscles on ext. region of foot except

extensor longus polleis pedis and lateral peroneals; contraction of tendo Achillis. Sept. 16, 1891, excision of head of astragalus, articular cartilage, and tendo Achillis; linear osteotomy of external malleolus. Began sitting up on sixtieth day. Feb. 3, 1892, walks easily, placing sole of foot flat.

389. Dr. Harry M. Sherman. Not published. Patient 18 years of age. Equino-varus, acquired. June 14, 1889, section of tendo Achillis and plantar fascia, and Thomas's wrench to straighten. Second operation Dec. 5, 1889, wedge-shaped piece removed from cuboid. Good and practically permanent result. Oct. 10, 1889, tendency to relapse. Plaster-of-Paris, Wyeth's night shoe, shoe with raised outer edge. Ankle motion. Died some months after operation; said to have died in a fit. Patient said to be an epileptic, but had no attacks while in hospital.

390. Same operator and reference. Patient 7 years of age. Varus, congenital. Previous treatment ineffectual. Aug. 2, 1891, cuneiform osteotomy in cuboid. Thoroughly satisfactory; still under observation for scoliosis. Night shoe, shoe with outer edge of sole thickened. Ankle motion. Whole limb is smaller. Sole has to compensate shortening, as well as hold varus corrected.

391. Same operator and reference. Patient 9 years of age. Equino-varus, left. May 2, 1891, section of ligaments, fascia, and tendo Achillis, by Phelps' method. Could not obtain complete correction even with Thomas's wrench. Second operation June 27, 1891, excision of astragalus and cuneiform osteotomy of os calcis by Phelps' method. Thoroughly satisfactory position. Result permanent. Modification of Wyeth's night shoe at night. Varus shoe, i. e., raised outer edge. Ankle motion.

392. Dr. Stephen Smith. N. Y. Med. Rec., 1879 (15), 491. Patient, female. Equino-varus, left, congenital. Excision of cuboid. Walking painful; Syme's operation finally. Good recovery.

393. Dr. Solly. *Lancet*, 1857, i. 478. Patient, male, 22 years of age. Varus, left, congenital. 1854, excision. Required subsequent tenotomy; moderately successful; walks with ease three years later. Scarpa's shoe. Tenotomy had been done on both feet, and shoes worn for two years, with cure of right foot, but failure in left.

394. Dr. Ed. Springfeldt. Inaug. Dissert. on Treatment of Club-foot, Bonn, 1884, 8vo, p. 46. Patient 10 years of age. Varus, right; already had had tenotomy and orthopedic treatment. Rigidity marked. Sept. 8th, resection of cuboid, and on Nov. 1st tenotomy of tendo Achillis. Good cure, but dorsal flexion hindered by prominence of caput tali. Dec. 8th, foot rests flat on ground; some adduction still present. Mechanical apparatus. Refers to resection of Davies-Colley, No. 57.

395, 396. Dr. Ch. Steeg. *Gaz. hebdomadaire de Méd. et Chir.*, Paris, 1889, 36th year, No. 52, Dec. 27. Patient, male, 14 or 15 years of age. Double varus. Jan., 1889, excision of astragalus and cuboid with section of plantar fascia. Satisfactory, foot firmly resting on heel and sole; slight incurvation, right foot. Dec. 27, 1889, excision of scaphoid and astragalus, left foot. Operator says: "This ablation of astragalus and scaphoid will probably be insufficient, and will compel me to remove the cuboid and the ant. part of os calcis, left foot. Braces.

397. Prof. Studsgaard. Dr. B. Loreuzen (On the Treatment of the Higher Degrees of Congenital Talipes equinus). Patient 3 years of age. Equino-varus. June 21, 1885, excision of astragalus and section of plantar fascia. Good position. Died short time after operation, of diarrhea.

398. Same operator and reference. Patient 9 years of age (same as 142, 143). Equino-varus, left. Feb. 1, 1885, excision of astragalus and os naviculare on left foot, and resection of ext. malleolus. Good position. Third operation Sept. 1886, three years later; considerable deformity of both feet. Scarpa's shoe and night splint. No subsequent ankle-joint motion.

399. Same. Patient 13 years of age. Equino-varus, right. Aug. 21, 1881, cuneiform osteotomy. Good position and function. Five years later good position and very good function. Modified Scarpa's shoe with rubber muscles. Ankle-joint almost natural.

400. Same operator and reference. Patient 1½ years of age. Equino-varus, left. July 7, 1882, cuneiform osteotomy. Good position. Four years later almost as good as just after operation. Metal braces.

401. Same operator and reference. Patient 9 years of age. Equino-varus, right. Oct. 19, 1882, excision of astragalus. Good position; slight motion.

402, 403. Same operator and reference. Patient 3 years of age. Double equino-varus. July 3, 1884, excision of astragalus, right; good position. Aug. 21, 1884, excision of astragalus, left; good position.

404, 405. Same operator and reference. Patient 7 years of age. Double equino-varus, marked. Aug. 2, 1885, excision of astragalus with division of plantar fascia, adductor hallucis, tendon of extensor hallucis, and int. ligaments; good position. Fifteen months later, good function; walks on sole of foot; slight adduction of forefoot. Scarpa's shoe and night splint shoe, right foot. Aug. 2, 1885, excision of astragalus and division of ligaments between os naviculare and first cuneiform bone. Good position. Slight ankle motion, left.

406, 407. Same operator and reference. Patient 15 years of age. Double equino-varus. Rigidity. Sept. 30, 1885, excision of astragalus and os naviculare and section of plantar fascia and adductor hallucis. Good position. One year later, function good; slight adduction of forefoot. Scarpa's shoe and night splint. Slight ankle motion, right. Oct. 2, 1885, excision of astragalus and ant. proc. of calcaneum and division of plantar fascia. Good position, right.

408, 409. Dr. Terrillon. *Bull. et Mém. de la Soc. de Chir. de Paris*, 1887, xiii., p. 726 (disc. on paper by Durel). Patient 1½ years of age. Double equino-varus, paralytic; complete reversal of feet inward and projection of astragalus. Legs thin and frail. June 7, 1887, extirpation of astragalus and simultaneous section of tendo Achillis, right. July 15, 1887, same operation, right. Feet straight, slight raising of int. edge at first, but walking gradually lessened this deformity. Most satisfactory.

410, 411. Dr. L. Tiffany. Patient 5 years of age. Double equino-varus. Excision of astragalus. Great improvement. One year later soles of feet on ground; walked and ran with ease. Wore braces for ten months. Ankle motion. Tendo Achillis, tibial tendons, and plantar fascia had been cut some time before, and child had worn braces.

412. Dr. Trendelenburg. Inaug. Disc. on Treatment of Club-foot, 8vo, Bonn, 1884. Ed. Springfield. Patient 7 years of age. Varus, right, congenital, extreme; suppurating about heel, and twisting of axis of malleolus. July 5, 1884, excision of tarsus. Good position and result; no drainage. Plaster.

413. Dr. Verbolzi. Centralbl. f. Chir., 1877, 24. Patient, female, 5 years of age. Equino-varus, congenital, double. One foot operated on—subperiosteal section, excision of astragalus. Immediate straightening. Cure—straight foot. Plaster-of-Paris, apparatus later. Previous tenotomy, plaster dressings, and failure.

414. Dr. Verneuil. Patient, male, 36 years of age. Varus, acquired from bimalleolar fracture; severe. 1881, excision of astragalus; tibia and fibula shortened. Drainage. In two months walked with apparatus. Plaster.

415, 416. Dr. Vogt. Inaug. Disc. on the Treatment of Club-foot, 8vo, Bonn, 1884, 46. Patient 1½ years of age. Club-foot, double, severe. May 4, 1885, excision of tarsus. Union by first intention. Good position; adduction of metatarsus, right. Plaster splints at night, left. Haltemann, Verwerthung und methode des extirpation tali. Diss., Griefswald, 1883.

417. Same operator and reference. Patient, very small child. Club-foot. June, 1883, excision of tarsus. Three weeks, wound healed. Felt splint.

418. Dr. Volkmann. Patient, male, 6 years of age. Equino-varus, acquired. Excision of astragalus. Rapid cure. Walks with a cane.

419. Dr. Weinlechner. Aertzlicher Bericht, des k. k. Allg. Krankenhaus zu Wien, v. 1, 1882 (Wien, 1883) p. 251. Patient 35 years of age. Equino-varus, left, paralytic; rotation excessive; int. malleolus almost hidden; ext. malleolus very prominent, also head of astragalus. Paraplegia. Nov. 11, 1881, cuneiform osteotomy of astragalus and calcaneum, and on Dec. 1st, removal of remainder of astragalus, which had necrosed. Two weeks later phlegmonous inflammation of almost entire leg requiring multiple incisions. Later a severe attack of diphtheria. March 11, 1882, erysipelas for six days, and several abscesses on foot. Wound not healed until April 30, 1882. Condition improved, but reduction incomplete.

420. Dr. W. Weiss. Gaz. des Hôp. aux Paris, 1885, 58th year, p. 251. Patient 18 years of age. Equino-varus, right, accidental; forefoot bent suddenly, sole inward, even with the tarso-metatarsal artie; partially luxated astragalus projects on back. Following myelitic atrophy of leg. April 3, 1884, tenotomy of tendo Achillis and section of plantar fascia. May 2, 1884, excision of astragalus (Boeckel's operation). Recovery slow. June 17th, slight suppurating. July 1st, began to use crutches; Aug. 1st, discharged from hospital prevented by hydrarthrosis of right knee. Good result, and everything satisfactory on March 1, 1885. Extension, motion; walking easy.

421. Dr. J. F. West. British Med. Journ., 1878, ii. p. 657. Patient, female, 23 years of age. Equino-varus, left, congenital; plantar fascia contracted, ungual phalanx of second toe overlapping big toe; pain on walking; contraction of tendo Achillis and tibialis anticus and aud posticus. May 19th, removal of astragalus, cuboid, and scaphoid. Ten weeks later useful limb. June 12th, ant. splint, and foot put in cradle. July 10th, gutta percha and splint. July 15th, inside gutta percha splint. Several abscesses formed on the foot from pressure of splints. Aug. 5th, wounds all healed, and light starch bandage put on and patient began walking.

422. Dr. James Whitson. Brit. Med. Journ., Lond., 1888, ii. pp. 919—927. Patient 3 years and 7 months old. Congenital equino-varus. Feb. 1883, excision of cuboid. Jan. 1884, section of tendo Achillis to correct equinus. Treatment continued twelve months. Five years later walks well. Metal splint shaped to foot and leg; later, paraffine boots. As soon as wound healed parts were stretched, under chloroform, and kept in position for several months. Paraffine boots renewed every month. Dr. Whitson thinks treatment after operation should be continued 12 to 18 months.

423. Same operator and reference. Patient 2 years and 3 months old. Congenital equino-varus. Aug., 1883, excision of cuboid. Treatment continued twelve months. Five years later walks well. Metal splint shaped to foot and leg; later, paraffine boots.

424, 425. Dr. H. A. Wilson. Not published. Patient 4 years of age. Equino-varus. Excision of astragalus. Entire correction. Three years later, foot straight. Braces for three years. Ankle-joint motion.

426, 427. Same operator. Patient 4 years of age. Equino-varus. Excision of astragalus. Entire correction. Eighteen months later foot straight. Ankle motion.

428, 429. Same operator. Patient 13 years of age. Extreme equino-varus. Spina bifida. Excision of astragalus. Entire correction. Eight months later foot straight. Braces. Excessive ankle motion.

430. Same operator. Patient 24 years of age. Equino-varus. Excision of astragalus. Entire correction. Fourteen months later foot straight. Ankle motion.

431. Same operator. Patient 21 years of age. Equino-varus. Excision of astragalus. Entire correction. One year later foot straight. Ankle motion.

432, 433. Dr. R. Wiuslow. Maryland Med. Journ., Balt., 1887-88. Patient, colored, 14 years of age. Double equino-varus, paralytic. Sept. 27, 1886, cuneiform osteotomy of calcis, cuboid, scaphoid, and astragalus, right. Jan. 30, 1887, cuneiform osteotomy of os calcis, astragalus, cuboid, and scaphoid, left. Feet normal in shape. Nov. 14th, shoe worn on right. Ankylosis (bony) did not occur, but limb was more rigid than before, right. Fracture-box for three days, then plaster.

434. Dr. Wyeth, reported by Dr. V. P. Gilroy. Trans. Med. Soc., N. Y., Syraense, 1886, p. 362. Patient 8 years of age. Equino-varus, right, marked. Astragalus dislocated and longer than normal. Division of tibialis anticus and posticus, tendo Achillis, and plantar fascia; no result. Then excised astragalus and wedge at calcaneo-cuboid articulation, Nov., 1885. Dressings removed in thirty days, and result perfect. Plaster-of-Paris.

435. Dr. Zeissel. Patient 27 years of age. Equino-varus, double, congenital; great force ineffectual. Excision of astragalus and calcaneum. Three months later foot inverted; walks with special boot.

APPENDIX.

Operators.	Operations.	Operators.	Operations.
Andrews	1	Moore	5
Augustoni, Panzeri	22	Morton, T. S. K.	1
Beauregarde	5	Morton, T. G.	1
Bennett	1	Mynter	13
Berger	2	Nélaton	6
Boeckel	7	Ollier	1
Bollié	1	Ore	3
Boursici	2	Paci	1
Boursier	1	Paekard	1
Bradford	9	Park	11
Brinkmann	7	Paroma	3
Bryant	1	Patterson	1
Burrell	4	Phelps	18
Butz	1	Picque	1
Championnière	11	Piechaud	3
Charon	5	Pilcher	3
Cotterill	1	Poinsot	1
Croft	2	Poore	5
Curtis	1	Postempski	1
Davis	4	Prince	1
Davies-Colley	1	Pughe	2
Davy	25	Quienu	2
Deschamps	48	Raffa	5
Dumont	2	Rawdon	2
Duret	2	Reclus	1
Fairbank	2	Reid	4
Ferrier	1	Renton	4
Fontaines	1	Ricketts	1
Fowler	6	Richet	1
Gibney	5	Sands	4
Gillette	3	Sehede	1
Goldschmidt	1	Schwartz	1
Goodman	1	Sherman	3
Grattan	23	Smith	1
Hartley	2	Solly	1
Holmemann	2	Springfeldt	1
Holmer	16	Steeg	2
Hueter	1	Studsgaard	11
Iversen	2	Terrillon	2
Jalaquier	3	Tiffany	2
Jones	1	Trendelenburg	1
Kirmisson	1	Verbelzi	1
LaFerte	1	Vcrneuil	1
LeBec	4	Vogt	3
LeDente	2	Volkman	1
Lenger	2	Weinlechner	1
Lucke	1	Weiss	1
Lund	4	West	1
MacGillivray	1	Whitson	2
Margary	1	Wilson	8
Marzocchi	3	Winslow	2
Mason	1	Wyeth	1
Mensell	1	Zeissel	1
Monnier	4		

Operators, 108.

Operations . 435